

# **Executive Summary**

## **Initial Appraisal of the Neosho River Logjam**

### **John Redmond Reservoir, Kansas**

**February 2005**

Sediment and debris have been noticeably collecting in the upper reach of John Redmond Reservoir (Reservoir) in the Neosho River (River) since the early 1970's. The Neosho River logjams appear to have consolidated and expanded in the River near the Reservoir before 2004. In 2004, the greatest accumulation of debris occurred since construction of the Reservoir and the logjam is now about 1.5 miles long. The extension of the logjam closed the Jacobs Creek Landing boat ramp that provided access to the Neosho River. Later in 2004 another logjam on Eagle Creek severed boating between Eagle Creek and the Neosho River.

Section 216 of the 1970 Flood Control Act (Public Law 91-611), as amended, provides general authority for the Secretary of the Army to review operations of completed projects when found advisable due to changed physical, economic, or environmental conditions. Identification of a need to modify structures or operations presumes that the needs exceed the opportunities available under existing project authority (operation and maintenance).

Discussions with local interests and government have identified a concern that the current logjam will "grow" upstream toward the community of Hartford and possibly impact river access via the Hartford boat ramp. A concern has also been expressed that the backwater effect of the logjam, even now, may be causing flooding problems as far away as Emporia. Human health concerns were investigated by the Kansas Department of Health and Environment. No significant issues were identified.

No assumption to quantify the upstream migration of the logjam (either terminus or rate of migration) is made for this assessment due to the many variables and general lack of data on which to base such an assumption. There is little risk that the current or foreseeable logjam could cause flooding outside of project lands, however. Real estate acquired for the project includes a flood control storage area that rises about 30 feet above the logjam.

The requirements for modification of existing projects established by Section 216 of the 1970 Flood Control Act and implemented by ER 1105-2-100 and ER 1165-2-119 are not met by the existence or conditions that may be created by the logjam in the Neosho River at John Redmond Reservoir. Therefore, the report contains no recommendation for modification of the project. Seven alternatives were examined to address the logjam and one alternative to offer a voluntary buyout and relocation of Jacobs Creek Landing property owners. The alternatives to address the logjam are described in the report and ranged in initial costs from about \$1 million (to clear the Jacobs Creek Landing boat ramp) to about \$65 million (to revitalize the resources of John Redmond Reservoir, including clearing of the logjam).

Maintenance measures described in the report are within the operations and maintenance authority of the project. They are briefly described below:

. • Maintenance Measure 1 – Remove the logjam in the vicinity of the Jacobs Creek Landing boat ramp. Clearing the logjam at this location will allow recreation access to the Neosho River and Refuge. There is a significant risk that the ramp will again be closed by additional debris. The preliminary estimated cost is \$370,000 initially, plus \$25,000 for annual maintenance.

. • Maintenance Measure 2 – Remove the logjam at the mouth of Eagle Creek and construct a permanent boat ramp on Eagle Creek to restore recreation access to the Neosho River and Refuge. An expansion of the Neosho River logjam to a point upstream of the mouth of Eagle Creek would preclude further clearing of the Eagle Creek logjam. Continued maintenance of the Eagle Creek access point would provide fishing and hunting access to the Refuge. The preliminary estimated cost is \$180,000 initially, plus \$25,000 for annual maintenance.

. • Maintenance Measure 3 – Construct and maintain a public access and boat ramp in the vicinity of Neosho Rapids. The loss of Neosho River access from the Jacobs Creek Landing and temporary Eagle Creek boat ramp leaves the Hartford ramp as the only public access to the fishing and recreation resources of the Neosho River within the John Redmond project lands managed by the U.S. Fish and Wildlife Service as the Flint Hills National Wildlife Refuge. Future logjams could continue to close the Jacobs Creek Landing and Eagle Creek access to the Neosho River. Construction of a Neosho Rapids access point will provide long-term access to the Neosho River with a relatively low risk of impact from logjams. The preliminary estimated cost is \$70,000, plus \$25,000 for annual maintenance. No additional maintenance costs would be required if the Jacobs Creek Landing boat ramp remains closed.

. • Maintenance Measure 4 – Develop and implement a long-term Neosho River debris and sediment removal plan for water resources and environmental management, regional economic development, preservation and/or restoration of water supply and flood control storage, and regional recreation resources. The preliminary estimated cost is \$3.3 million initially, plus \$50,000 for annual maintenance starting at the end of construction.

The recommended maintenance measure is to construct and maintain a public access and boat ramp in the vicinity of Neosho Rapids. Construction of this access point would provide long-term access to the Neosho River with a relatively low risk of impact from logjams. The preliminary estimated cost is \$70,000, plus \$25,000 for annual maintenance.

Annual program maintenance and fiscal priority decisions made at the national level may not allow this effort to be included in the Corps' budgetary submission; however, it will be prepared and submitted in Fiscal years 2007 through 2012.

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### **Description of Problem**

Sediment and debris have been noticeably collecting in the upper reach of John Redmond Reservoir (Reservoir) in the Neosho River (River) since the early 1970's. The slope of the stream is very flat where the River enters the lake and that, in part, has caused sediment to be deposited in a mudflat. The mudflat has in turn caused woody debris that would otherwise flow into the lake to collect in logjams at various locations over time. A location map is shown on page 2.



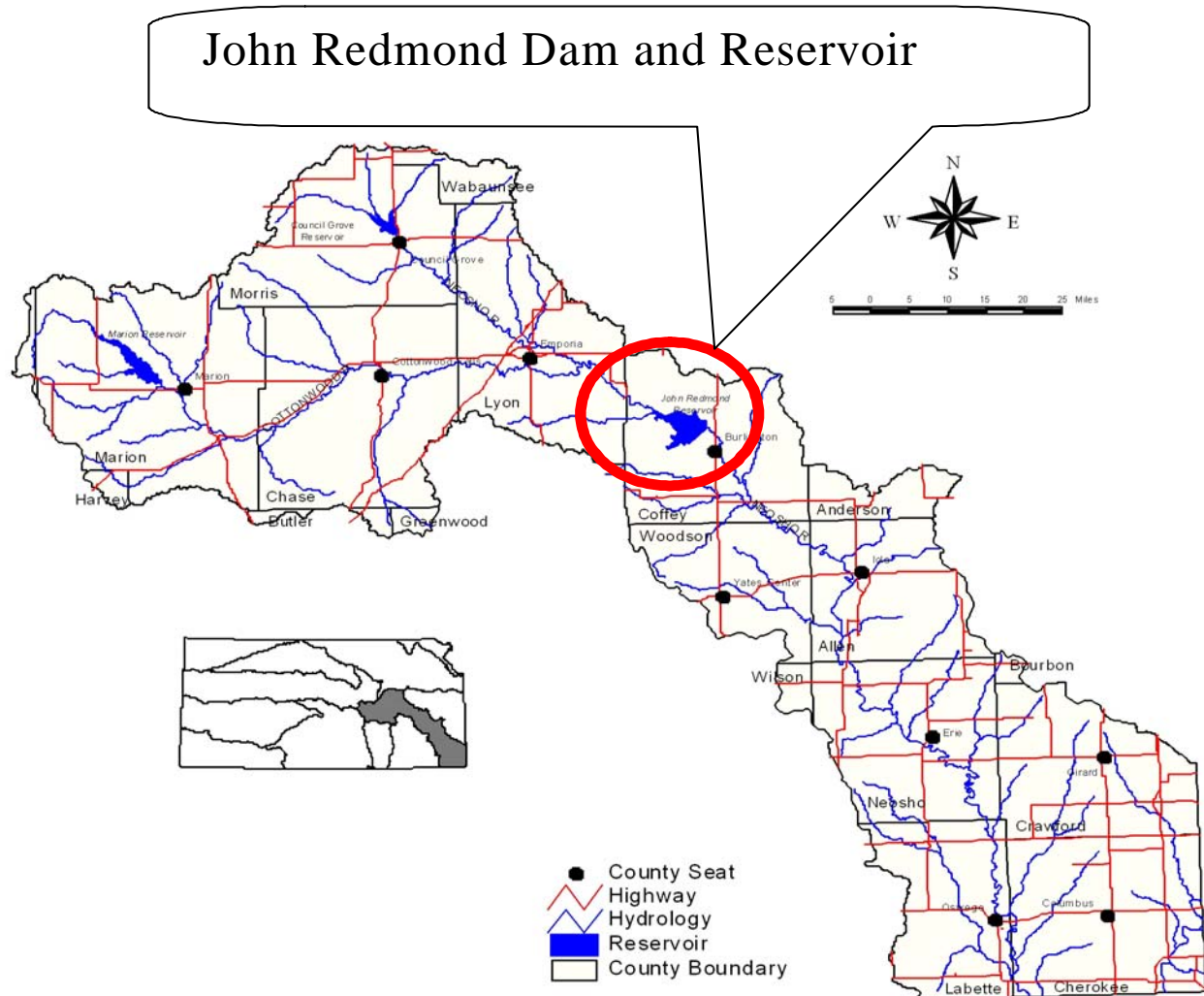
Initially, the logjams were more of a curiosity than an issue for local residents. However, when the first John Redmond Reservoir storage reallocation proposal was coordinated for public comment in 1975/1976, local residents raised issues about the current logjams and how future conditions might affect Reservoir access and recreation. Those concerns were again expressed when the second storage reallocation was coordinated for public comment in 2001. Those comments are presented in this report.

The Neosho River logjams appear to have consolidated and expanded in the River near the Reservoir before 2004. Enclosed information discussed later in this report describes logjam conditions at different times. From the filling of the Reservoir in 1964 until about 1990, boating access between the Reservoir and the River was possible. During the late 1980's and early 1990's, boating between the River and the Reservoir was dependent on a combination of Reservoir levels, River flows, and changing logjam conditions. In 1991 or shortly thereafter, access between the River and the Reservoir was not possible. In 2004, the greatest accumulation of debris occurred since construction of the Reservoir. The logjam that existed at the beginning of 2004 was about 3/8 of a mile long. After the heavy spring rains and resulting River flows, the logjam had increased to over 1.5 miles.



The severe ice storm in 2002 and higher than normal runoff in the spring of 2004 are generally believed to have caused enough additional debris to be added to the previous logjam so that in June 2004 the Jacobs Creek Landing boat ramp was unusable (see photo, courtesy of Jacobs Creek residents).

## Neosho River Basin in Kansas



### DATA SOURCES:

Hydrology: EPA RF 1  
Political Boundaries: KCD  
Towns: GNIS/USGS  
Roads: 100K DLG/USGS/DASC

This map intended for planning purposes only.

Kansas Water Office, May 1999

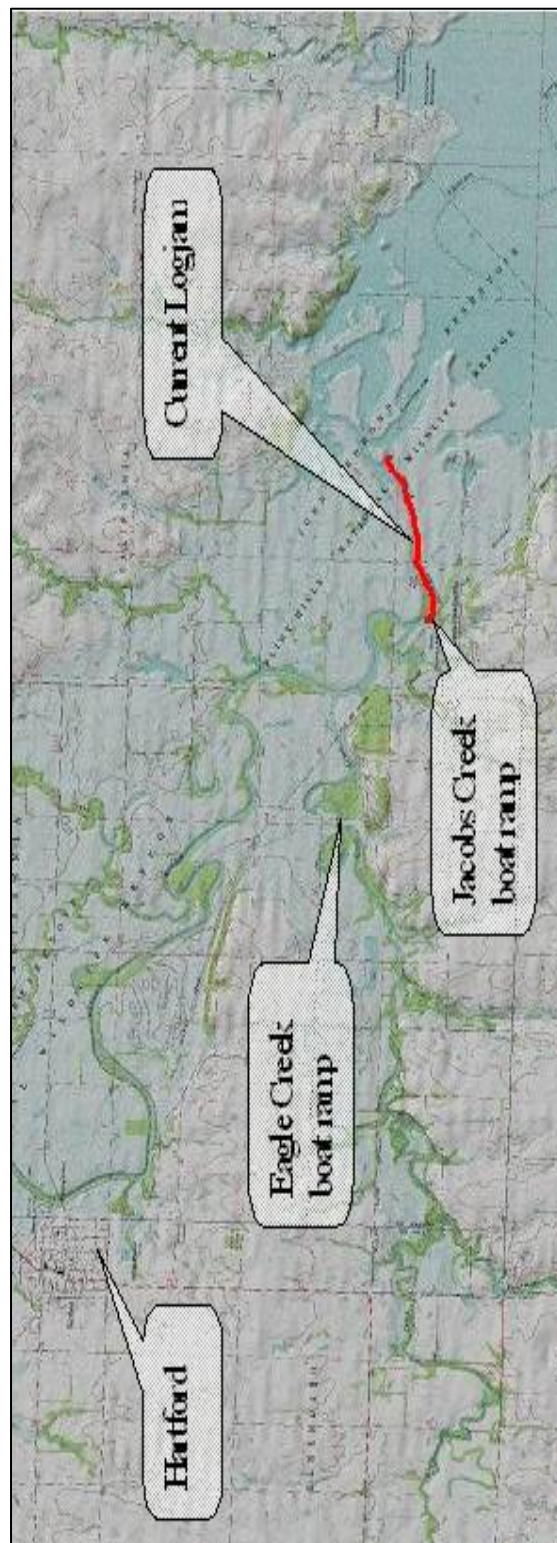


The closest river access to Jacobs Creek Landing is about 8 river miles upstream at Hartford, Kansas. Hartford overlooks the Neosho River and adjoins the Flint Hills National Wildlife Refuge (Refuge).

The Neosho River could also be accessed from Eagle Creek immediately upstream where a temporary gravel ramp was constructed in 2004 in an effort to address the loss of the Jacobs Creek Landing access for fishing and hunting. Eagle Creek enters the Neosho River about a mile upstream of the Jacobs Creek Landing. A logjam was found to be blocking the mouth of Eagle Creek during a field visit in December 2004. From local accounts and aerial photography, it was understood that sediment was noticeably accumulating at the mouth of Eagle Creek for at least the past 15 years. The accumulation of sediment made boat access to the Neosho River difficult and dependent on higher River stages and Eagle Creek flows. The Eagle Creek logjam is about 100 yards in length and spans the width of the Eagle Creek channel.

The property around the logjams at the Neosho River and Eagle Creek is owned by the Federal government and managed by the U.S. Army Corps of Engineers as part of the lands required for operation of the Reservoir. The Corps-managed lands upstream of the Reservoir comprise the Refuge. The Refuge is managed by the U.S. Fish and Wildlife Service and extends about 3 miles upstream of Hartford to the vicinity of Neosho Rapids, Kansas. The Refuge is described later in this report.

The illustration shows the Reservoir (in the lower right corner), Jacobs Creek Landing (on the south side of the Neosho River toward the center of the image), Eagle Creek (running from the lower left corner toward the center of the image), and the Neosho River (flowing from the northwest as it passes Hartford). The locations of logjams at various times are shown on subsequent illustrations. The initial logjam, often referred to as the “plug” locally, comprised the first 500 feet of the downstream end of the current logjam shown in the picture to the right.



## Study Authority and Study Process

Guidance for conducting Section 216 evaluations is contained in Engineering Regulation (ER) 1105-2-100, dated 22 April 2000, Planning Guidance Notebook, and ER 1165-2-119, dated 20 September 1982, Modifications to Completed Projects.

Section 216 of the 1970 Flood Control Act (Public Law 91–611), as amended, provides general authority for the Secretary of the Army to review operations of completed projects when found advisable due to changed physical, economic, or environmental conditions. Identification of a need to modify structures or operations presumes that the needs exceed the opportunities available under existing project authority (operation and maintenance). A report is made to Congress on the advisability of modifying structures or operations. The Section 216 authority specifies that two additional phases of study be conducted; these are under the General Investigations (GI) program.

**General Investigation Authority.** A reconnaissance study is the first additional phase of a GI study and is Federally funded. Typically, a reconnaissance study is completed within 12 months. A positive finding of Federal interest for one or more economically justified alternatives is sufficient to enter into coordination with a potential local sponsor for the second phase of study. Non-Federal sponsors may be public agencies such as State, county, city, or other entity fully empowered by State law. The reason for this negotiation is that the second phase of study is cost shared with a non-Federal local sponsor. The reconnaissance study could be initiated when directed by Congress in a water resources development act or water and energy appropriation act and when funded as a new start study in an appropriation act.

The second and more detailed GI study phase is a feasibility study that is equally funded by the Federal government and a local sponsor. The 50/50 cost sharing was implemented by the Water Resources Development Act of 1986. In-kind products and services may satisfy up to 100% of the non-Federal share. Upon completion, the feasibility document supports the decision process of Congress for authorization of implementation (construction). The costs associated with implementing a plan recommended in a feasibility study and subsequently authorized by Congress are traditionally allocated between the Federal government and a local sponsor in accordance with the basic project authority and existing policies – generally a 65% Federal share and a 35% local sponsor share. The Federal participation in GI studies and projects is not capped, but is usually specified by specific Congressional legislation authorizing a project.

**Section 1135 Authority.** In addition to the GI program, the Corps of Engineers authority, provided under Section 1135 of the Water Resources Act of 1986 as amended, may be applicable to address the logjam or remedies to the environmental conditions resulting from the logjam. Section 1135 provides the authority to modify existing Corps projects or resources affected by projects to restore habitat. A local sponsor must contribute 25% of the cost of the project, and land, easements and rights-of-way are counted as a portion of the cost share. In-kind products and services may also satisfy the local cost-sharing requirement, but not more than 80% of the non-Federal share can be in-kind contributions. The Federal share of a Section 1135 project is capped at \$5 million and includes studies, plans and specifications, and construction.

Funding is appropriated to a discretionary fund managed by the Corps. Any proposed modifications that would exceed the \$5 million Federal limit would require specific Congressional authorization.

Private interests such as Ducks Unlimited or the Nature Conservancy may be a non-Federal sponsor if no future operation and maintenance costs are required.

The first step under Section 1135 is preparation of a Preliminary Restoration Plan (PRP) that consists of a narrative outlining project information, details of the desired project modification, pertinent financial information, and a map of the project area. The cost of the PRP is Federally funded. The PRP acts as a request (within the Corps) to initiate a feasibility study and is submitted to the Corps' higher authority for approval. A request letter from a non-Federal entity must accompany the PRP. The purpose of the request letter is to verify the local sponsor's understanding of their obligations and responsibilities under the program and their willingness and ability to participate as a non-Federal sponsor for project modifications.

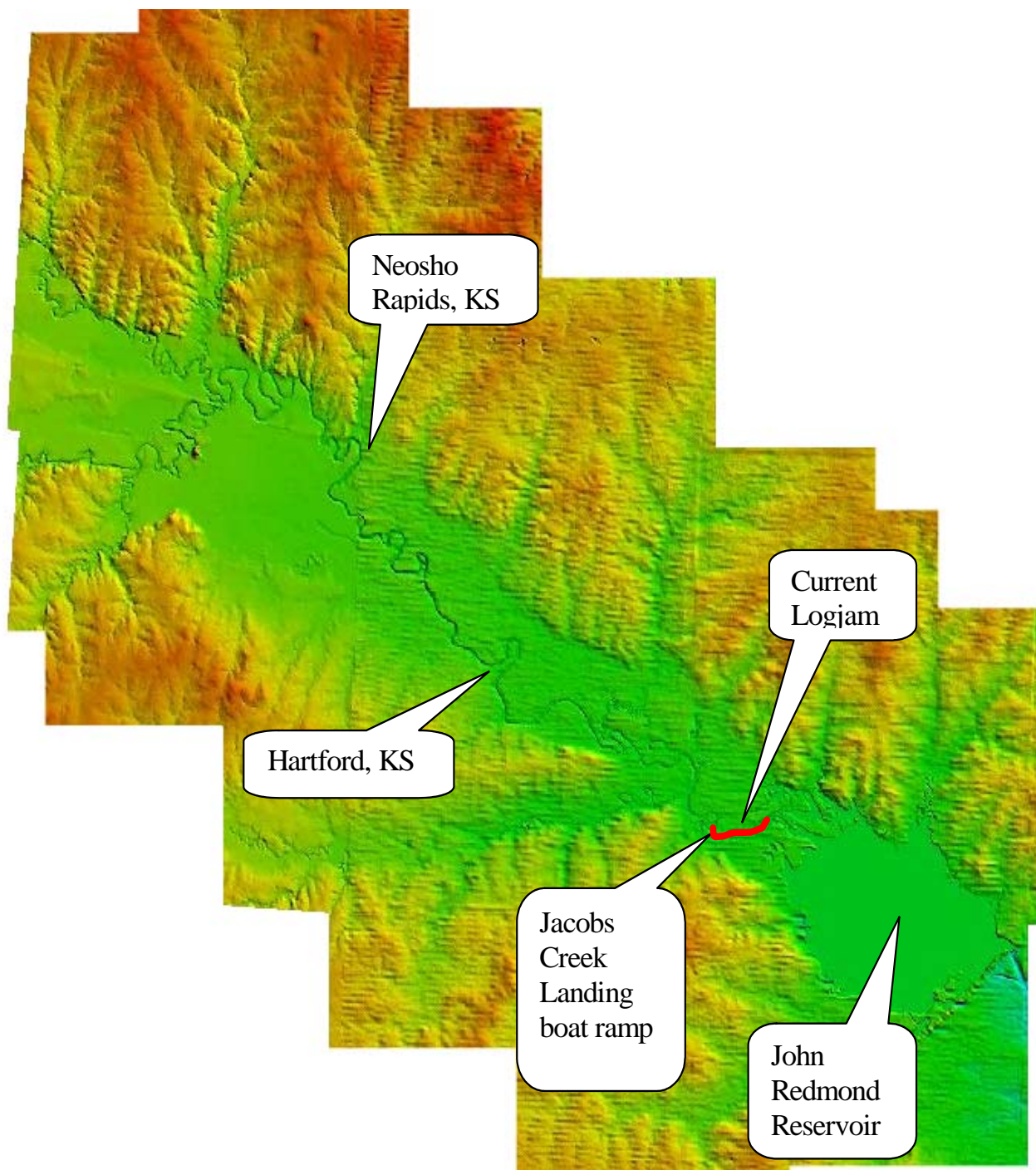
The second step is a feasibility study called an Ecosystem Restoration Report (ERR). The project described in the report must be economically feasible; environmentally sustainable, and have local sponsorship. The cost of the feasibility study is initially funded by the Federal government. No funds are available to initiate a Section 1135 study in fiscal year 2005.

**Operating Project Authority.** Operation and maintenance of existing project facilities provides another opportunity to address the logjam issue. Historically, only the woody debris that has accumulated on the embankment has been removed using operation and maintenance (O&M) authority and funding.

The O&M maintenance measures identified in this report are considered to be within the authority of the project and would be subject to funding through supplemental O&M appropriations. Based on recent trends of declining O&M appropriations, allocating O&M funds to address the logjam would result in delays of other operation or maintenance tasks at John Redmond Dam and Reservoir and/or at one or more other operating projects. This report does not address O&M budget priorities or identify potential maintenance activities that would be deferred. Therefore, this report cannot assess potential risks, hazards, or economic penalties that would be associated with deferred maintenance.

## Area Overview

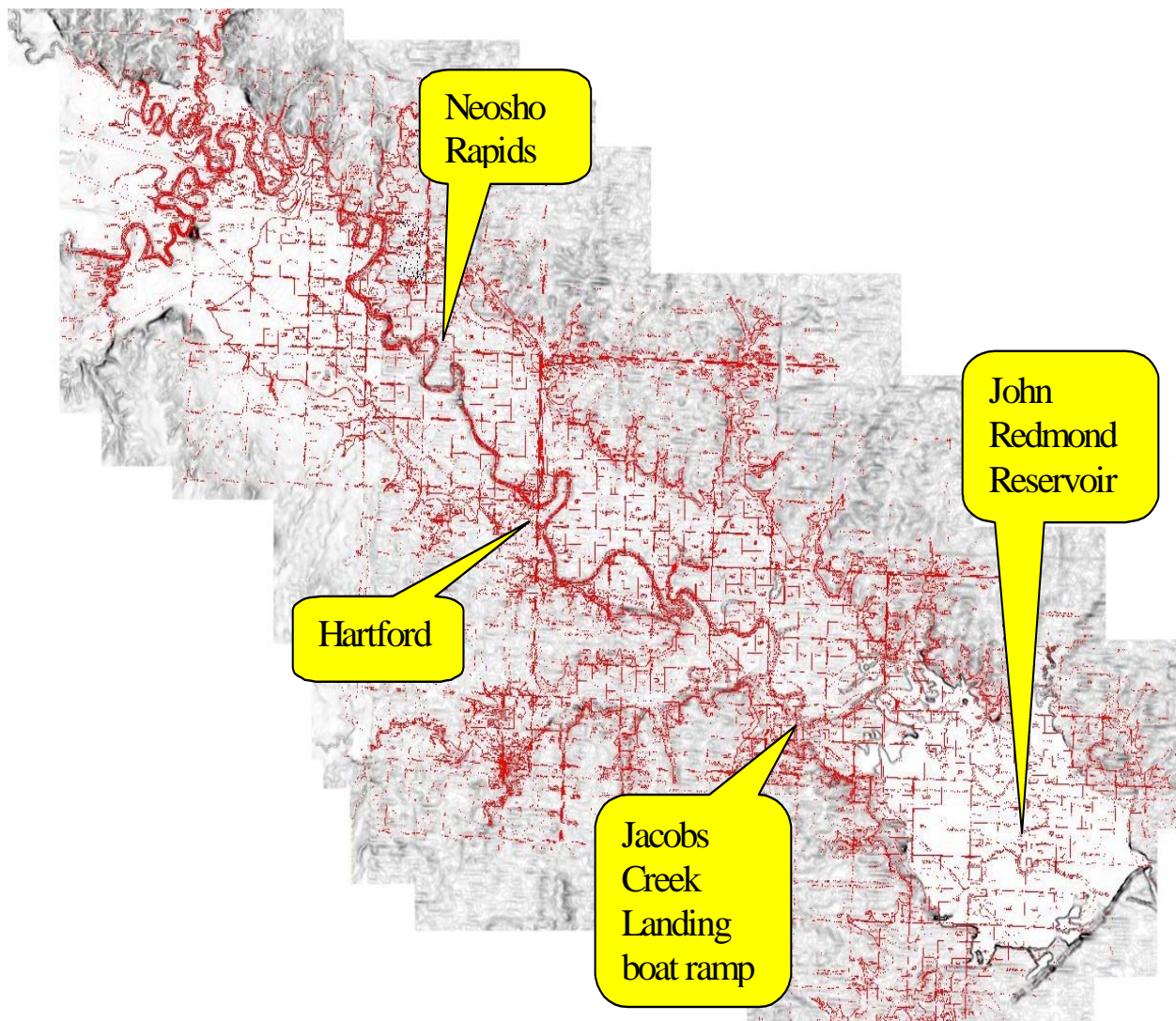
The illustration below shows a shaded elevation model of the Reservoir conservation pool (lower right) and the upstream Neosho River valley extending to the northwest. Communities in the vicinity and the current logjam location are also shown. Red indicates the higher elevations (hill tops). Green indicates lower elevations (valley floor).





A similar illustration below contains the real estate acquisition information at the time of construction. While the scale of presentation does not allow the reader to discern any details of the acquisition map, it is presented to show the real estate acquisitions far upstream of the Reservoir pool. Generally, wherever red is shown, there was a real estate acquisition of either fee title or flowage easement nearby.

Acquisitions were made to the limit of where changes in storage and upstream flooding caused by operation of the Reservoir for flood control could be expected. No effects of the Reservoir operation would be experienced upstream of the acquisitions. That includes the effects of over 30 feet of water stored above the conservation pool during coincident flood events specified for reservoir design and real estate acquisition.





## History and Existing Conditions

*The following description excerpts are from the Tulsa District website:*

[http://www.swt.usace.army.mil/recreat/ViewHistoryMessage.cfm?tblMessages\\_LakeName=John%20Redmond%20Reservoir](http://www.swt.usace.army.mil/recreat/ViewHistoryMessage.cfm?tblMessages_LakeName=John%20Redmond%20Reservoir).

*The John Redmond project was authorized as "Strawn Dam." The town of Strawn was relocated 6 miles eastward on higher ground when the dam was constructed. The old town site is now under water.*

*In 1958, Congress renamed it John Redmond Dam and Reservoir for the Burlington Daily Republican's publisher, John Redmond, a beloved figure in Kansas newspaperdom who had received his training under the great William Allen White of the Emporia Gazette. One of the first to champion the causes of flood control and water conservation along the Neosho River, Mr. Redmond's work along these lines continued from the early 1920's until his death in 1953 at the age of 79. His dream of controlling floods in the upper Neosho had started to become a reality with authorization of the four dams in 1950.*



*The fertile Neosho Valley was flooded 57 times in 34 years, with the worst flood coming in 1951, one year after Congress authorized the project. Floodwaters ran 30 feet deep at the dam site and one-third million acres were under water.*

*John Redmond Dam was pressed into flood control operation several weeks before final completion, protecting the Neosho River Valley for the first time from damaging floods.*

*Designed and built by the U. S. Army Corps of Engineers, Tulsa District at a cost of \$29,264,000, the project was started in 1959 and placed in flood control operation in 1964. The John Redmond project was authorized by Congress under the Flood Control Act of 1950.*

*The following description excerpts are from the Tulsa District website:*

[http://www.swt.usace.army.mil/recreat/OPSField.CFM?tblOPSField\\_LakeName=John%20Redmond%20Reservoir](http://www.swt.usace.army.mil/recreat/OPSField.CFM?tblOPSField_LakeName=John%20Redmond%20Reservoir).

*John Redmond Dam is located on the Neosho River about 3 miles north and 1 mile west of Burlington, Kansas, just off U. S. Highway 75. John Redmond Reservoir is located in the broad Neosho River Valley. The rolling hills afford the visitor an opportunity to see many acres of agriculture and grassland. Fields of wheat, corn, and maize are abundant. Large areas of grasses including big bluestem, little bluestem, Indian grass, switch grass, brome grass, and sideoats grama can be seen from the rolling hilltops. The lower areas consist of*

wooded cover of such species as elm, black walnut, hickory, ash, hackberry, cottonwood, and cedar.

*The Kansas Department of Wildlife and Parks has a license to 1,472 acres of the project lands for wildlife management near the John Redmond Dam. The licensed area is known as the Otter Creek Game Management Area and is managed primarily for bobwhite quail, mourning dove, greater prairie chicken, cottontail rabbit, squirrel, and deer.*

*John Redmond Reservoir has recreation parks that provide camping and picnicking facilities. These facilities include individual camping units (table, cooker, lantern stand, and parking pad), potable water, and sanitation facilities. Also provided are group shelters, toilet facilities, swimming beaches, and boating launching ramps.*

***The following Reservoir description excerpts and discussion of the logjam are from the draft SUPPLEMENT TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT [SFEIS], Prepared For: Reallocation of Water Supply Storage Project: John Redmond Lake, Kansas, U.S. Army Corps of Engineers; Tulsa District. [Literature and figure references contained in these excerpts may be found in the SFEIS. The excerpts are referenced by page number from the draft SFEIS. The contents of the final SFEIS are subject to change before a final report is filed. Highlighting is used to point out logjam text from the report.]***

*[ES-1] Water storage began during September 1964, collecting drainage from an approximately 3,015-square mile drainage basin. John Redmond Dam lies below Marion Dam, constructed on the Cottonwood River (a tributary to the Neosho River), and Council Grove Dam, also constructed on the Neosho River, and is the integral component of this flood control system. Uncontrolled drainage to the John Redmond Dam includes approximately 2,569-square miles below the upper two dams. Below John Redmond Dam to the Grand Lake O' the Cherokees in Oklahoma, an additional 7,238 square miles of uncontrolled drainage releases water to the Neosho River.*

*[ES-1] John Redmond Reservoir contains three types of water storage that are separated by zones from the top to the bottom of the lake: flood control pool, conservation pool, and inactive storage. The upper zone provides 534,417 acre-feet of flood control storage and is reserved to contain floodwaters; it otherwise remains empty and is managed for agriculture, wildlife habitat, and recreation under the Otter Creek State Wildlife Area, Flint Hills National Wildlife Refuge, and USACE authorities. The conservation pool provides 50,501 acre-feet of storage for water supply, water quality, and space to contain sediment. The pools, dam structure, agricultural land, wildlife habitat, and recreation sites are contained within approximately 29,798 acres.*

*[1-7] Two public scoping meetings were held in conjunction with the notice of intent. The first meeting was held on 29 March 2001, in Burlington, Kansas, and the second meeting was held on 5 April 2001, in Chetopa, Kansas. In addition to these public scoping meetings, another meeting was held with the Neosho Basin Advisory Committee on 16 March 2000. The purpose of these meetings was to inform the public of the upcoming water supply reallocation study and to allow citizens an opportunity to comment on the*

*proposed 2-foot raise in the conservation pool water level at John Redmond Lake. An advertisement for the scoping meetings was placed in the Coffey County Republican newspaper on 14 March 2001. Press releases were sent to 47 newspapers and radio and television stations for publication or announcement (Appendix A). Copies of the presentation and handout materials are also included in Appendix A.*

*[1-8] Burlington, Kansas. Thirty individuals representing the public, county agencies, and State agencies attended the scoping meeting held in Burlington, Kansas. Only two written comments were received at the meeting, but attendees could also obtain comment forms to fill out later and return by mail. The following is a synopsis of the concerns expressed by attendees of the Burlington, Kansas, meeting:*

- *Remove the logjam at Jacobs Creek.*
- *Cut a channel around the logjam.*
- *Logjam creates a higher pool in the upper reaches of the lake.*
- *Removal of the logjam would permit water to enter the conservation pool.*
- *Include seasonal pool management plan in the reallocation study.*
- *Keep riffles at Hartford clean for madtom habitat.*
- *Concern for flooding Neosho madtom habitat.*
- *Operations Division should clean out logjam, as done in early years.*
- *Logjam is causing increased flooding of USACE property upstream of John Redmond Lake, around flood pool lands, and upstream to Emporia, Kansas.*
- *Determine if the increased conservation pool limits Kansas Department of Wildlife and Parks (KDWP) seasonal pool manipulation plans.*
- *Raising the conservation pool will adversely impact the KDWP OCWA management area (1,600 acres) and make it flood more frequently.*
- *More damage to crops due to increased flooding because of conservation pool raise.*
- *Animals are being forced out of their habitat because of higher water levels (i.e., increasing crop damage and increasing car/deer accidents).*
- *Stream bank caving caused from the way the USACE operates John Redmond Lake, losing cushion of extra flood control storage.*
- *Should build detention ponds above John Redmond Lake to trap sediment as was promised before John Redmond Lake was built.*
- *Build Cedar Point Lake like the USACE was supposed to.*
- *Increase in conservation pool will increase the duration and frequency of flooding on easement lands.*
- *K-130 bridge increases backwater effects.*
- *High pools isolate non-easement lands preventing farmers from harvesting crops.*

*[1-8] The USACE has also received a petition (2001, specific date unknown) signed by 101 individuals from Jacobs Creek, Burlington, Emporia, Hartford, and Neosho Rapids, Kansas. The petition requests the removal of a logjam 0.9 mile east of the Jacobs Creek (Strawn) boat ramp. The petitioners state that the logjam is causing road and property flooding (Appendix A).*

[3-10] Near the upper end of the reservoir, north of Jacobs Creek Landing, an inflow debris field, dubbed locally as the logjam, has formed in the channel of the Neosho River at a point where the river flow is divided into two channels around an island. River flows slow sufficiently in this reach to allow floating driftwood carried from upstream to be captured by other driftwood and debris already deposited in this 3/8-mile-long site. This logjam is an impediment to boaters desiring access from the reservoir directly up the river to other launching facilities. Under certain conditions it may also represent an impediment to fish movement between the river and the reservoir.

[3-21] For the Neosho River, removal of the logjam would result in a large quantity of sediment residing there to be exported or transported into the conservation pool of John Redmond Lake, further affecting water supply storage. A thorough analysis of this river reach would be warranted to determine sediment quantity and possible fate prior to logjam removal attempts.

[3-26] A drift logjam up to 3/8 mile in length [updated in later discussion in this IA] occurs in the Neosho River near the Jacobs Landing site. The logjam has formed above an island in the Neosho River, which causes the river to fork into two channels (Figure 3-4). This logjam has attracted local attention in favor of removal, and was the topic of comments obtained during public meetings held in Burlington, Kansas. Although the logjam does not contribute to downriver flooding, it is quite large and was considered cost prohibitive to remove (FHNWR 2000).

[3-26] Local citizens attempted removal of the logjam by burning during the summer of 1999, but the wet wood would not carry the fire (FHNWR 2000). The accumulated debris at the site is considered economically unfeasible to remove by demolition or mechanical means. The Neosho River may eventually form a new channel around this location, south of the existing channel (Jirak, personal communication, 2001).

[3-27] Some effects of the logjam or large woody debris accumulation in the Neosho River north of Jacobs Creek Landing and west of the reservoir have been identified and include:

- an impediment to navigation by boat between the lake and upriver sites
- slowing or dissipation of Neosho River flows resulting in some backwater formation
- diversion of water over the access road to the Jacobs Creek Landing boat ramp during high flow events for the Neosho River
- aggradation (raising) of the riverbed due to accumulation of sediment; the sediments also serve to anchor the logjam into the riverbed
- dropping of sediments within the John Redmond flood control pool rather than the conservation pool
- formation of a structure resistant to erosion, much like a geologic feature might be
- future island formation or formation of a cut-off oxbow when sediment deposition is sufficient

- a source for driftwood to accumulate and possibly float into the reservoir and against the dam structure during flood events

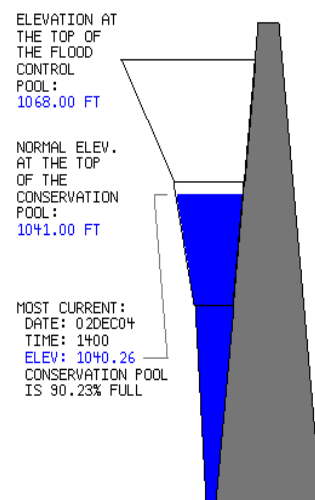
[3-27] In addition to the observed effects listed above, the following research would benefit any potential logjam removal analysis:

- (1) determination of other, similar examples of large woody debris accumulation for other reaches of the Neosho River and the effect,
- (2) study of the effects of raising the reservoir water level to 1041.0 feet on debris accumulation and navigation at the logjam site,
- (3) economic analysis of logjam removal, hauling, storage, and disposal versus other alternatives, such as opening a new, more direct channel into the reservoir, and
- (4) examination of different forms of large woody debris management, including upriver prevention measures.

The lake storage graphic and table are from the Tulsa District website:

<http://www.swt-wc.usace.army.mil/JOHN.lakepage.html>

	Elevation (feet)	Incremental Storage		Cumulative Storage	
		(inches)	(acre-feet)	(inches)	(acre-feet)
Surcharge Pool	----	----	----	----	----
Flood Control Pool	1068.00	3.45	555,472	3.88	623,136
Conservation Pool	*1041.00	0.42	67,626	0.42	67,664
Inactive Pool	1020.00	0.00	38	0.00	38



\* Reflects the proposed 2<sup>nd</sup> two-foot storage reallocation from flood control to water supply storage which also matches the seasonal conservation pool level on this date.

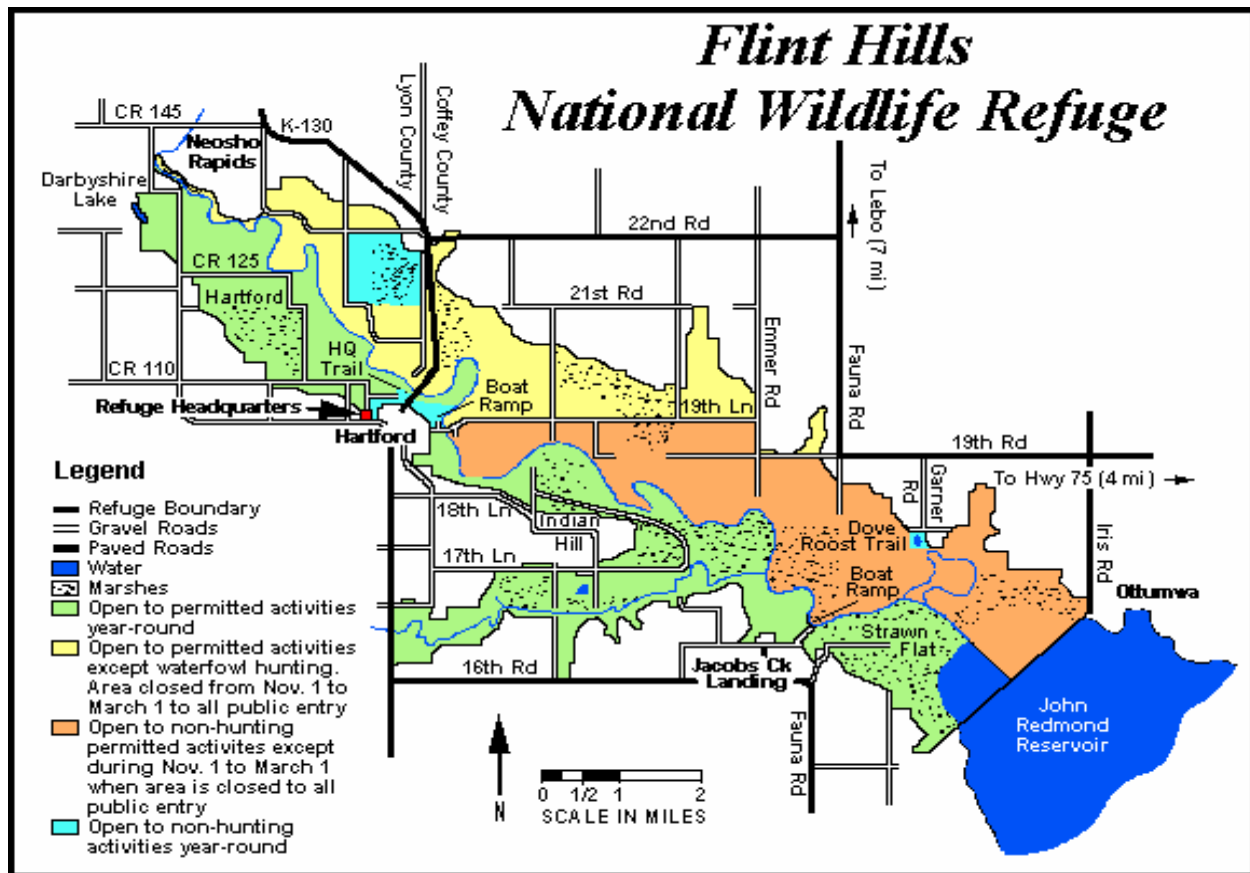
The following description excerpts and graphics are from the Flint Hills National Wildlife Refuge website: <http://flinthills.fws.gov/>

Flint Hills National Wildlife Refuge is one of a system of over 500 refuges administered by the U. S. Fish and Wildlife Service and dedicated to the preservation and conservation of wildlife. Named for the Flint Hills Region just to the west, the refuge consists of 18,500 acres located on the upstream portion of John Redmond Reservoir on land owned by the U. S. Army Corps of Engineers.

Established in 1966, the refuge is managed primarily for migratory waterfowl. Intensive use by ducks and geese occurs during the spring and fall migration. Farmlands are managed on a share basis with area farmers with the refuge share providing food for migrating waterfowl and resident wildlife. Numerous ponds and a system of shallow marshes provide additional waterfowl habitat. Waterfowl and bald eagle management



*requires that portions of the refuge be closed and that public access during periods of intensive waterfowl use be restricted.*



Since the logjam upstream of the Reservoir was described in 2002, a significant accumulation of debris occurred in the spring of 2004. The total length of the logjam is currently estimated at over 1.5 miles in length. The large accumulation of woody debris is generally attributed to three factors: (1) the existence of a smaller logjam since about 1991 (the plug); (2) an ice storm that severely damaged trees in southeastern Kansas in 2002, including a portion of the upper Neosho River Basin, and (3) a wetter than normal spring in 2004 with corresponding higher and longer than normal river flows that carried debris into the Neosho River.

Residents and local government interests have indicated that large amounts of woody debris are still present along the Neosho River and tributary streams and that if a wetter than usual spring in 2005 or a large flood event occurs, a similar or larger “growth” of the logjam may be experienced. Corps field assessments in December 2004 support local findings of large amounts of deadfall near river and stream courses. This relative comparison is made to the Walnut River Basin to the west and the Arkansas River main stem in Oklahoma.

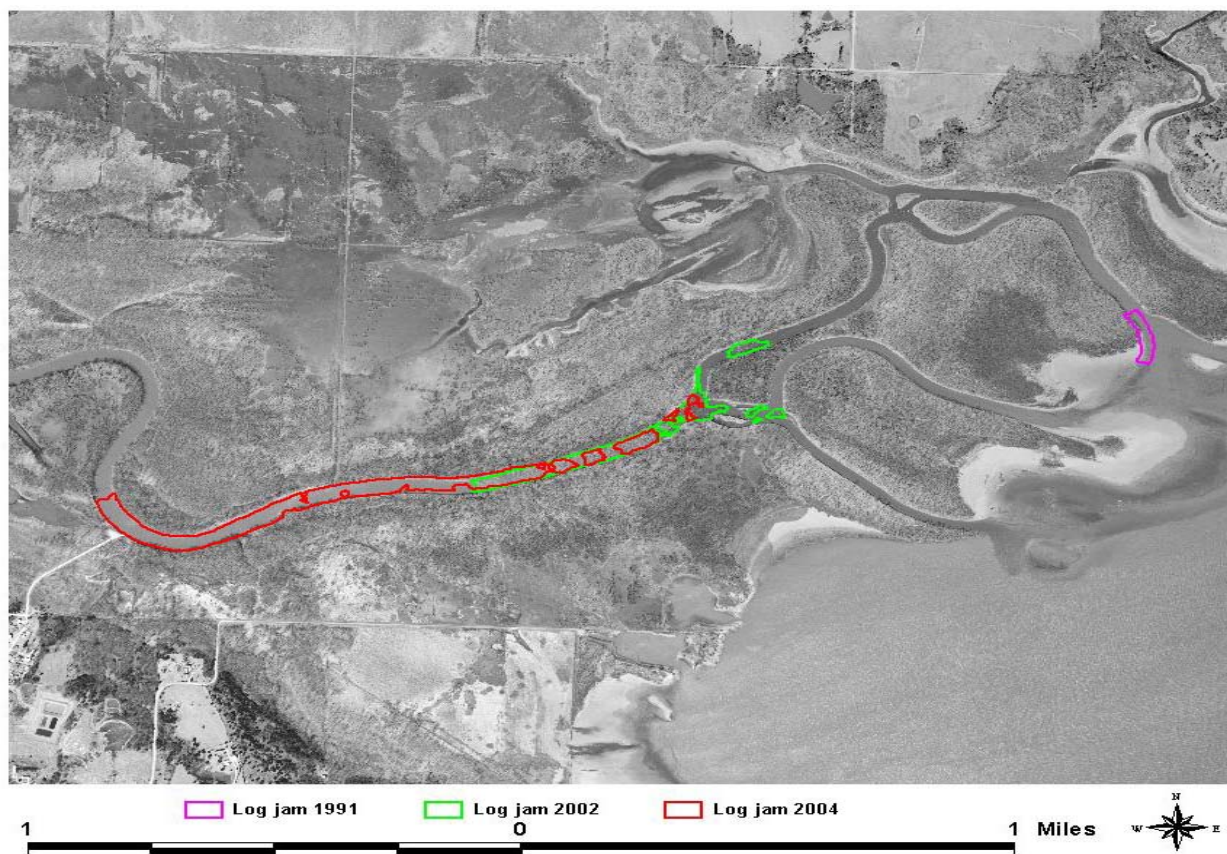
Ice storms are not uncommon in the Midwest and could result in periodic increases in the amount of deadfall along watercourses upstream of the current logjam in the River. Ice storm contributions to debris would be in addition to trees and limbs that otherwise may enter the

watercourse through erosion of live trees, natural life cycle processes, or human actions. The Reservoir area experienced an ice storm in January 2005 that damaged trees.

The Federal Emergency Management Agency's announcement of the 2002 ice storm and a map of disaster-designated counties are attached (Enclosure 1). A second map is shown with the Neosho River Basin outline superimposed. The worst areas of ice storm damage were downstream of John Redmond Reservoir.

An assessment by Scott L. Satterthwaite, Kansas Department of Health and Environment (KDHE), dated 9 September 2004 (Enclosure 2), shows an estimation (on page 9 of the presentation) of logjam locations in 1991, 2002, and 2004. That illustration, reproduced below, shows the significant accumulation of debris in 2004 as it built upstream (to the left of the illustration) and resulted in closure of the Jacobs Creek Landing (boat ramp). The spectral imagery was a product of analysis conducted by the Kansas Biological Survey and Kansas Applied Remote Sensing Program for the Kansas Department of Health and Environment to identify potential solid waste items contained in the log jam.

The Jacobs Creek Landing access road can be seen approaching the River and logjam from the southwest (on the lower left portion of the illustration). The upper end of the Reservoir is on the lower right of the illustration.



formed in 2004 can be seen. It is assumed that smaller debris is shifting under the pressures of flowing water on the larger logs. If these conditions and parameters were documented or more readily apparent, it might be possible to forecast the risk of upstream migration of the logjam. Unfortunately, those data are not available and developing that information is outside the scope of this report.



Regardless of the limitations discussed above, it is assumed that the location of the current logjam will not significantly be reduced from its current position in the Neosho River. At its current location it will continue to block the Jacobs Creek Landing for the foreseeable future. It is further assumed that any consolidation of the existing materials that might allow the upstream end of the logjam to move downstream of the Jacobs Creek Landing will over time be overshadowed by the future addition of debris. The annual contributions of materials to the logjam are assumed to be sufficient in volume to maintain the size and location of the existing logjam or to extend the logjam upstream.

It is assumed that proposed or potential storage reallocations and increases in conservation pool elevation will not serve to float a significant portion of the logjam free of the Neosho River. Large flood flows and previously high flood control pool elevations have not caused previous logjams to float free of their locations.

It is assumed that a large flood event would serve to compress and float free a relatively small portion of the existing logjam, but that additional woody debris is likely to be transported by such an event and that additional debris would offset any compression of the length of the existing logjam.

No assumption to quantify the upstream migration of the logjam (either terminus or rate of migration) is made for this assessment due to the many variables and general lack of data on which to base such an assumption.

White bass spawning (runs) from the Reservoir to the River has become sporadic over the past several years. The change from annual white bass runs is attributed, in part, to the restriction posed by the logjams, and also, in part, to changing habitat conditions in the Reservoir. Without further study, it is not possible to determine whether the spawning years represent concurrent enabling conditions of: a) reservoir elevation and floodplain overflow caused by the logjam; b) if spawning was accomplished utilizing flow pathways through the logjam; c) both spawning routes were utilized, or (d) spawning downstream of the logjam. It is assumed that the current, much larger logjam will pose a greater hindrance to upstream movement for white bass and other aquatic species and may limit downstream movement of some species. The impacts on annual white bass runs poses a detrimental and long-term environmental impact on the white bass species and therefore on the overall ecosystem in the Reservoir. These impacts would also be measurable in the local and regional economy.



Visitation at the Jacobs Creek Landing access road was last estimated for October 2004 based on area visitation. The table shows vehicle estimates for the previous year. Older access road data could not be located in time for consideration. The vehicle count estimates were not assumed to relate to an average number of passengers or fishing or hunting events. Fishing and hunting access documentation or creel surveys were not located during development of this report.

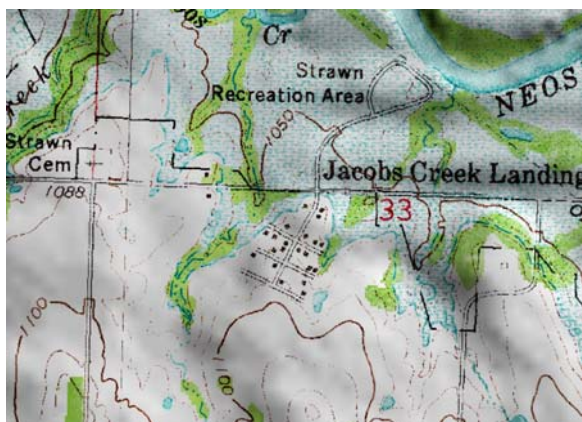
Month	Year	Vehicles
October	2004	241
September	2004	433
August	2004	234
July	2004	697
June	2004	863
May	2004	977
April	2004	1,003
March	2004	322
February	2004	383
January	2004	211
December	2003	332
November	2003	417

Information from residents suggests the following fishing usage at the Landing. In the spring and fall, there appear to be about 15 to 20 people who access the Jacobs Creek Landing for fishing per day. When there are white bass runs, the fishing visits can be from 50 to 75 people per day. White bass runs were once an annual event, drawing fishermen from the surrounding region, including distances as far as Kansas City. At other times of the year fishing access is lower.

No visitation information exists for the Eagle Creek boat ramp.

Residents also indicate that some portion of the vehicle traffic is short-term access to the ramp to check on River conditions for fishing, hunting, or sightseeing.

The Jacobs Creek community, access road, and boat ramp are shown in the illustrations below. The \_\_\_\_\_ Census identified 57 residents. Some properties are used part time for vacationing.



Potential impacts under these assumed no-action conditions would include:

- More frequent over bank flow within the Refuge on floodplain lands. Overland flow has the potential to alter the riparian habitat vegetation communities, alter wildlife usage, restrict hunting access, and carry sediment and small debris into the Reservoir as

An information paper was presented by David Penny of Master's Dredging Company, Inc., to Coffey County Commissioner Fred Rowley, Jr., and to Jacobs Creek residents. The paper, titled "*Project to Remove the Neosho River Logjam at the Entrance to John Redmond Reservoir*" has been subsequently distributed to State legislators and Congressional interests, who have in turn referred the paper to the Corps for the information it contains. The paper provides valuable information on the history and current condition of the logjam. The paper is attached (Enclosure 3) because of its wide distribution. No company endorsement is implied.

One statement in the paper requires comment. Page 3 contains the following wording: "In the case of the raft above John Redmond Reservoir, the immediate removal of the logjam can prevent the destruction of the present national wildlife refuge and the flooding of the village of Jacobs Creek." The implication of refuge destruction and future flooding of lands other than those lands acquired for operation of the Reservoir as a result of the current logjam or a reasonable forecast of future logjam conditions appears to lack substantiating analysis.

## **Forecast Future Conditions Without Logjam Removal (the No Action Plan)**

All assumptions presented in this report are based on professional judgment having assessed the information described herein.

The forecast conditions assuming "no action" form a baseline from which to compare potential solutions. The potential solutions are the action plans.

Discussions with local interests and government have identified a concern that the current logjam will "grow" upstream toward Hartford and possibly impact river access via the Hartford boat ramp. A concern has also been expressed that the backwater effect of the logjam, even now, may be causing flooding problems as far away as Emporia. The potential for the logjam to extend upstream of its current location is dependent on rainfall, runoff, and stream flow (for which significant amounts of data and predictive models exist) as well as future ice storms and other factors that would produce woody materials for expansions of the logjam (for which relatively little information exists to predict future conditions). Currently, the logjam blocks a portion of the Neosho River channel. In that configuration, there appears to be sufficient floodplain available to convey "normal" and flood flows without causing flooding upstream of Corps lands.

The logjam that occurred in 2004 is the only recorded event of such a magnitude at the Reservoir since it was impounded 40 years ago. The 2004 logjam is roughly four times larger than any previous logjam. Based on the limited data available, there is an opportunity for the logjams to grow in length. However, a lack of data and information about the interrelationship of riparian agricultural practices, riparian forestry, and basin hydrologic and meteorological parameters prevents a definitive conclusion concerning growth of the current logjam. In addition, when considering a future projection of conditions, the issues of "natural" processes of logjam decomposition and (new) channel migration compound the difficulties in forecasting conditions. The lower end of the "plug" that formed in the late 1980's or early 1990's is decomposing and has partially cleared. Also a "compression" of the upper end of the logjam that



a new Neosho River channel is formed. Flow that cannot pass through the logjam will utilize the floodplain area. Flow will follow the path of lowest resistance in its downhill route to the Reservoir.

- The logjam and resulting overland flow (versus in-channel flow) would tend to increase the elevation of stream flows upstream of the logjam (backwater effects). If the logjam were to migrate several miles upstream (for example, another 10 miles or so), an assessment of the risk of backwater effects may be necessary. Under that set of conditions, backwater effects might eventually exceed the boundaries of lands acquired for operation of the Reservoir. (Note that the flowage easements were acquired at elevation 1075, over 30 feet higher than the Conservation Pool with the proposed (2<sup>nd</sup>) storage reallocation.)
- A continued loss of the Jacobs Creek Landing ramp access to the Neosho River would relate to:
  - A potential reduction in Jacobs Creek Landing property values.
  - A reduction in local fishing and an associated local economic impact.
  - A regional reduction of fishing and an associated regional economic impact.

In this report, the three following parameters are assumed factors that should also be considered in forecasting future conditions in the absence of large scale Federal or State action to deal with the logjam:

- There will likely be a third conservation pool elevation increase from flood control storage to water supply storage.
- Unmet needs for boat ramp access to the River will be met, in part, through improvement or development of other access points.
- Sedimentation of the Neosho River and John Redmond Reservoir will continue to impact various natural, recreation, and economic resources.

Because of the large height of the flood control pool (about 30 feet) and the associated project design, hydrologic modeling, and real estate acquisition, there is no reasonable expectation of a logjam causing flooding outside of project lands.

## **Storage Reallocations**

The first storage reallocation was implemented in 1976/1977 to make an equitable redistribution of the storage remaining between the flood control pool and the conservation pool due to uneven sediment distribution. The conservation pool was raised from elevation 1036 to 1039 to increase the water supply storage. Prior to that reallocation, sediment had been collecting mainly in the conservation pool, thereby reducing the conservation pool storage faster than was predicted.

The second storage reallocation study is underway and is scheduled to be completed early in 2005. The need for the second reallocation was the same as before – equitable redistribution of remaining storage.

A third and final storage reallocation is likely. Assuming the third storage reallocation is implemented within the next 50 years, the conservation pool would be at elevation 1043.

## **Fishing Access**

The Eagle Creek or Hartford ramps are assumed to provide the most viable locations for fishing access. The Eagle Creek ramp currently only provides access to Eagle Creek fishing due to the recently formed logjam at the mouth of Eagle Creek. The permanency of the Eagle Creek logjam is unknown. The Hartford ramp only provides access to the Neosho River. In the absence of large-scale debris removal, channel clearing, pilot channel, property buyout, or other major action, it is assumed that one or both of these ramps will be improved to partially offset river fishing access lost at the Jacobs Creek Landing ramp.

Improvement of the ramps (or other facilities) at one or both of these locations presumes that the more catastrophic projections by local residents of logjam expansion will not occur. If the logjam on the Neosho River were to extend another mile upstream of its current terminus, it would also block the Eagle Creek confluence, thereby limiting fishing from the Eagle Creek ramp to only Eagle Creek. If the Neosho River logjam were to extend at least 8 miles upstream of its current location, both the Eagle Creek confluence to the Neosho River and the Hartford community ramp to the Neosho River would be blocked. In that event, the next most likely access point would be upstream at Neosho Rapids. No public access is currently provided at Neosho Rapids.

## **Institutional Support**

The Corps supports the Kansas Water Office in the application of the State's Watershed Restoration and Protection Strategy (WRAPS), watershed planning, and riparian forestry management to reduce the risk of conditions that developed between 2002 through 2004 that resulted in the 2004 Neosho River logjam.

The WRAPS program has been discussed by various State agencies as an approach to reduce the risks of logjams occurring in the future at any location along Kansas's streams. The WRAPS program would not address the existing logjam at John Redmond Reservoir, but it could reduce future maintenance costs for either the no-action plan or any of the action alternatives that might be implemented by reducing the amount of woody debris that would be transported down the Neosho River. Information about the strategy is contained in Enclosure 4.

*The following excerpt is extracted from the Kansas Water Office website:*  
[http://www.kwo.org/KWP/Rpt\\_Watershed\\_Res\\_Protection\\_WISP\\_Summary\\_060704\\_kf.pdf](http://www.kwo.org/KWP/Rpt_Watershed_Res_Protection_WISP_Summary_060704_kf.pdf)

The Watershed Restoration and Protection Strategy approach is intended to provide a framework to: 1) provide a means of engaging all stakeholders of a watershed in a

collaborative process of identifying watershed restoration and protection needs, establishing management goals and, selecting a cost effective plan to achieve the goals; and 2) provide a report that documents the decisions of the watershed stakeholder team concerning goals, the action plan, and the resources required to execute the action plan.

## **Description and Assessment of Potential Solutions (In Contrast to Forecast Future Conditions Without Logjam Removal)**

These are the action plans (or solutions) considered for implementation. They are described in qualitative terms and are generally compared to the no action plan. Occasionally, comparisons are made between solutions to highlight specific features or differences. In the following discussion, “maintenance measures” are considered to be near-term solutions that are within the operational authority of the project. The discussion of “alternatives” refers to long-term solutions that would require study under the reconnaissance/feasibility GI process or Section 1135 authority. The study and implementation of alternatives would require a cost sharing sponsor.

Four near-term maintenance measures are discussed. These measures are considered to be within the operational authority of the Corps. Minimal assessment is discussed with respect to the availability of funding, operational priorities, economic feasibility, or long-term viability. It is assumed that these are short-term responses and could be revised or stopped based on future conditions, management decisions, or the lack of funding due to budgetary limitations. Any maintenance measure’s future funding would be subject to national priority ranking based on performance based budgeting.

**Maintenance Measure 1. Remove the logjam in the vicinity of the Jacobs Creek Landing boat ramp.** This ramp has a long history of access, and the Neosho River is a significantly larger area in which to fish than is available at Eagle Creek (the temporary access point). The cost of removing debris in the immediate vicinity of the boat ramp would be relatively low. However, there is an unquantifiable risk of failure in that additional accumulations of debris next spring (or subsequent years) could close the ramp again. If the ramp were then abandoned, the cost of debris removal would have provided minimal benefit. If the decision were to continue debris removal, the overall cost of maintaining the ramp would include periodic debris removal.

If another large accumulation of debris does not occur, this measure could provide social and economic benefits. Environmental issues are modest, if measurable, for implementation of this measure. Monitoring the accumulation of debris through the spring of 2005 before implementing this measure would provide a small insight into its viability.

**Maintenance Measure 2. Remove the logjam at the mouth of Eagle Creek and construct a permanent access road and boat ramp on Eagle Creek.** Constructing permanent facilities on Eagle Creek and providing access to the Neosho River through debris removal and dredging of the sediment accumulation would have a higher initial cost, but would have a lower associated risk of failure in the event of large future debris flows. The length of the current

Neosho River logjam would have to increase by another mile before impacting Eagle Creek access to the Neosho River. This is believed to be the first time a logjam on Eagle Creek has blocked access to the Neosho River. Environmental issues would be greater with this measure due to the need for sediment removal and disposal from the mouth of Eagle Creek. The proximity of Eagle Creek to the Jacobs Creek Landing community would, in part, tend to mitigate potential social and economic impacts due to the loss of the Jacobs Creek boat ramp.

**Maintenance Measure 3. Construct a permanent boat ramp on the Neosho River at Neosho Rapids.** Constructing an access point at Neosho Rapids would provide a reduced risk of failure due to large debris accumulations. The current Neosho River logjam would have to fill another 8 miles or more of the Neosho River before reaching Neosho Rapids. The cost and environmental impact of a new boat ramp would be relatively low. The potential impacts to the Jacobs Creek Landing community from the loss of the Jacobs Creek boat ramp would not be mitigated by a new ramp at Neosho Rapids. A social and economic benefit would be expected for the community of Neosho Rapids.

**Maintenance Measure 4. Develop and implement a long-term Neosho River debris and sediment removal plan.** Removal of debris and sediment at the lower end of the logjam would occur annually. Adaptive management would allow the development of long term forecasts for ultimate removal of the logjam. Implementing removal of the logjam over a longer period of time would reduce the risks of sediment loads impacting the water supply storage; disturbance of the Refuge, including migratory bird habitat and hunting; exceeding total maximum daily loads of contaminants in the Neosho River in Kansas and Oklahoma; and would provide opportunities to minimize overall funding as site specific knowledge of best management practices is gained. The overall environmental impacts would be higher than the other near-term measures because of the large scope of logjam removal. Economic and social impacts of the 2004 loss of the Jacobs Creek Landing boat ramp would not diminish significantly until the long-term plan was completed. The plan could begin in the near term, but would span about 20 years. This measure would require a significant increase in O&M funding.

Below are discussions of eight long-term alternatives. Current authorities for new-start civil works projects would require detailed study and implementation cost sharing. The assessment of the approach consists of the following post-completion conditions.

**Alternative 1. Clear the Neosho River logjam in the vicinity of the Jacobs Creek boat ramp to a location downstream on the Neosho River (for example, 200 yards downstream). To provide a temporary storage area for future debris while minimizing the initial costs of removal, allow a new River channel to form. (This alternative differs from Management Measure 1 by over excavating the existing logjam and providing a long-term plan of maintenance that would ensure that the ramp provides access to the River for a planning horizon of about 50 years). The assessment of this alternative consists of the following post-completion conditions:**

- The Jacobs Creek ramp would be accessible for river fishing with conditions similar to those of about the past 15 years. Future woody debris would continue to collect and would require removal. As debris accumulates in the temporary storage area, it would

be removed on an as-needed basis. The need to budget for funding to maintain ramp access on a 1 or 2 out-year budget would be a factor in determining the size of the temporary storage area in the River.

- The Reservoir would not be accessible in the near term and might not be accessible in the future. Over time, a channel is anticipated to form to convey River flows around the logjam. It is expected that as a new channel forms, the current Neosho channel will be cutoff from low flows and will eventually fill with sediment, the woody debris will decompose, and the old channel will convert to terrestrial habitat.
- As-needed log clearing maintenance would be required at the boat ramp location, perhaps annually. There is a risk of occasional periods of ramp closure if large debris accumulations occurred as in the spring of 2004.
- Deadwood removal would require a disposal process, either by chipping, burning, or decomposition, and would require a disposal area. The disposal area options are on refuge lands or on lands to be acquired. Refuge lands are an attractive option due to the proximity to the debris removal location, but disposal within the Refuge would impact habitat wildlife and possibly recreation activities.
- Hunting access to the Refuge from the Jacobs Creek location would be dependent on floodplain overflow conditions downstream of the Jacobs Creek boat ramp and potential backwater conditions that may cause floodplain overflow upstream of the ramp.
- This relatively small scope of action would have a relatively low initial cost of implementation.
- Similar to the cost of implementation, there would be (assumed) a relatively low annual maintenance cost.
- Dependent on the area used for debris disposal, there could be a low level of impact to the Refuge or to the overall environment. However, maintenance activities would include long-term, low-level recurring impacts as additional debris was removed from the River and placed in the disposal area.
- This approach includes a risk of occasional significant accumulation of debris that could temporarily block fishing access before removal could be completed. Funding and a 2-year budget cycle for the Corps of Engineers could result in delays of 1 to 3 years before removal could be completed.
- This approach affords an opportunity for a new channel to form, thereby providing lake access at some future date. As the channel forms, a significant number of live trees would need to be removed from the new channel banks to minimize the risk of more costly removal as they fell into the newly forming channel.
- This alternative has an associated risk that any future channel will also become temporarily impassible due to new logjams. Until the new channel geometry is sufficient to carry large debris, there would be a high risk of new logjams forming.
- This approach relates only to the symptoms of the boat ramp problem and excludes the causes of the problem in the upstream watershed or downstream in-lake sedimentation. This approach would not address the mudflat in the upper end of the lake.
- The effort and expenditures for management is likely to vary from year to year until the new channel becomes relatively stable. Until then, estimating annual maintenance for budgetary purposes will be speculative, especially for maintenance of the new channel for tree removal along the bank and newly forming logjams.



- The potential local social acceptability is assumed to be low to moderate by only providing a return to River fishing access conditions similar to about the past 15 years, but no assurance of Reservoir access from the River. That assumption is supported by the alternative's component to ensure future River access through maintenance of the Jacobs Creek Landing. There is also a lesser potential for future Reservoir access along the naturally formed channel. The potential effect of this alternative on the local economy and Jacobs Creek real estate prices would be a moderate stabilizing influence.
- Regional social acceptability is assumed to be low to moderate. Access would be limited to the River only, in the near term. Visitors traveling to fish and boat may be inclined to use lake access instead of competing for parking space and a more limited area in which to fish in the Neosho River.
- The potential for economic justification and overall Federal interest would be low. Costs significantly exceed social and economic impacts of no action. The potential exists for a low level of environmental impact and associated mitigation costs. Formation of a new Neosho River channel would tend to support white bass runs to the Neosho River, but there appears to be a moderate risk of failure in the absence of a stable channel and a dredged opening through the in-lake mud flat. Other in-lake issues would also influence white bass.
- The ability to construct the alternative would be high due to the small scope, cost, and environmental impacts.
- Environmental sustainability would be moderate due to recurring maintenance and associated low-level environmental impacts. The formation of a new channel would tend to aid fish passage between the Reservoir and the River. The aquatic connection would provide an opportunity to support annual white bass runs. However, the potential for success of a newly and "naturally" formed channel capable of facilitating annual white bass runs is judged to be poor.

**Alternative 2. Excavate a pilot channel to the Reservoir avoiding the logjam. Extend the pilot channel through the in-lake mudflat by dredging. Leave the balance of the logjam in place and abandon the Jacobs Creek boat ramp (suggested by some residents). The pilot channel alignment would be chosen to minimize the risk of logjams and facilitate easier maintenance access. Geomorphologic conditions would be assessed for the design of a stable channel, also for minimizing maintenance. The assessment of the approach consists of the following post-completion conditions:**

- The Jacobs Creek boat ramp would be permanently closed. The local economy and real estate prices would be dependent on improvements of other River and Reservoir facilities for hunting and fishing. It is likely that the Jacobs Creek Landing real estate values would be lower than the pre-2004 logjam conditions.
- River access to the Reservoir would not be possible in the near term and may not be possible in the future. The time required for a new stable channel to form is unknown. In the interim, white bass runs would be expected to be sporadic, thereby impacting the local economy and fishing success.
- As-needed log clearing maintenance would be required at the boat ramp location and along the pilot channel, perhaps annually.

- Deadwood removal requires disposal, either by chipping, burning, or storage for decomposition.
- Creation of a pilot channel would require overland or barge equipment movement, live tree removal along the pilot channel location, and soil and tree disposal areas.
- Hunting access to the Refuge from the Jacobs Creek location would be dependent on the amount of floodplain overflow downstream of the Jacobs Creek boat ramp and potential backwater conditions that may cause floodplain overflow upstream of the ramp. Floodplain overflow would potentially diminish as the pilot channel formed a stable Neosho River channel.
- The approach would have moderate initial costs of implementation. The pilot channel would include an additional cost over the previous alternative as would dredging through the mud flat in the upper end of the Reservoir.
- Moderate annual maintenance costs would be incurred to remove debris in and along the Neosho River to provide unobstructed river flow to the Reservoir and to avoid the formation of a new logjam.
- There would be a moderate level of impact to the Refuge or to the overall environment. Maintenance activities would include long-term, moderate-level recurring impacts due to debris and sediment removal in the River and the mudflat area of the Reservoir.
- This approach includes a risk of occasional significant accumulation of debris that could temporarily block fishing access at the Jacobs Creek Landing boat ramp before debris removal could be completed.
- This approach includes an opportunity that a stable channel will form along the pilot channel, thereby providing lake access at a future date. The approach also suggests that backwater effects caused by the current logjam will be reduced as the pilot channel forms a stable Neosho River channel. There is an opportunity that backwater effects of the current logjam may be eliminated as a stable channel forms.
- The alternative poses a risk that any future channel will also become impassible due to new logjams. Maintenance would include periodic removal of significant accumulations of debris and sediment in the channel. However, temporary logjams may close the pilot channel to fish or fishing access between the Reservoir and the River.
- The approach relates only to the symptoms of the boat ramp problem and potential backwater conditions of debris in the Neosho River. It excludes the causes of the problem in the upstream watershed and only partially addresses the downstream in-lake sedimentation by maintaining a clear flow passage through the mudflat. Ultimately, sedimentation of the Reservoir will prompt consideration of another storage reallocation from flood control storage to water supply. That third reallocation would be the final operational modification available due to the physical geometry of the embankment and reservoir basin. Maintaining regional surface water supply storage far into the future would require:
  - significant structural modification to the Reservoir embankment and reservoir perimeter,
  - storage restoration through dredging, or
  - construction of a new reservoir.
- Local social acceptability of the alternative would be low due to the permanent loss of the Jacobs Creek Landing. Access to the Reservoir would not be assured from the

River. The primary purpose of the pilot channel would be for “normal flow” conveyance of river flows. The pilot channel would be maintained through the removal of debris and sediment. Fish movement between the Reservoir and the River may occur at times when flow is sufficient. The connectivity between Reservoir and River is expected to improve as the pilot channel forms a stable channel capable of conveying “normal” river flows. Improvement of an alternate River access ramp would likely be included in this alternative. Those ramp improvement costs are considered to be negligible when compared to the pilot channel construction and maintenance costs.

- Regional social acceptability is assumed to be low to moderate. Access would be limited to the River only, in the near term. Visitors traveling to fish and boat may be inclined to use lake access instead of competing for parking space and a more limited area in which to fish in the Neosho River.
- The potential for economic justification and overall Federal interest would be low. Costs significantly exceed the social and economic impacts of no action.
- Constructability would be high due to moderate scope, cost, and impacts. Construction and maintenance would utilize standard techniques.
- Environmental sustainability would be moderate due to recurring maintenance and associated moderate environmental impacts. The eventual formation of a new channel would tend to aid fish passage between the Reservoir and the River. The restored fish passage would provide the opportunity to restore annual white bass runs, which in turn would measurably improve the local economy.

**Alternative 3. Clear the Jacobs Creek Landing ramp and downstream reach and create a pilot channel into the lake; dredge through the in-lake mudflat but leave the balance of the logjam in place. The pilot channel alignment would be chosen to minimize the risk of logjams and facilitate easier maintenance access.**

**Geomorphologic conditions would be assessed for the design of a stable channel, also for minimizing maintenance. The assessment consists of:**

- The Jacobs Creek ramp would be accessible for River fishing.
- The Reservoir would be not accessible in the near term and may not be accessible in the future.
- As-needed debris clearing maintenance would be required at the boat ramp location and along the pilot channel, perhaps annually.
- Deadwood removal requires disposal by chipping, burning, or storage for decomposition.
- Creation of a pilot channel would require overland equipment movement, live tree removal along the pilot channel location, and soil and tree disposal areas.
- Hunting access to the Refuge from the Jacobs Creek location would be dependent on floodplain overflow downstream of the Jacobs Creek boat ramp and potential backwater conditions that may cause floodplain overflow upstream of the ramp.
- This alternative would have a moderate initial cost of implementation.
- This alternative would have a moderate annual maintenance cost to remove debris in and along the Neosho River to provide unobstructed river flow to the Reservoir.
- A moderate level of impact would occur on the Refuge environment, and maintenance activities would include long-term, moderate-level recurring impacts.

- The approach includes a risk of occasional significant accumulation of debris that could temporarily block fishing access at the boat ramp before removal could be completed.
- The approach includes an opportunity that a stable channel will form along the pilot channel, thereby potentially providing lake access at a future date. Implementation of this alternative also suggests that backwater effects caused by the logjam restriction will be reduced by the pilot channel and essentially eliminated as a stable channel forms.
- This alternative includes a risk that any future channel will also become impassible due to new logjams. Maintenance would include periodic removal of significant accumulations of debris.
- The approach relates only to the symptoms of the boat ramp problem and potential backwater conditions of debris in the Neosho River. It excludes the causes of the problem in the upstream watershed and only partially includes downstream in-lake sedimentation by clearing and maintaining a channel through the in-lake mud flat.
- Potential local social acceptability would be expected to be moderate by providing a return to Neosho River fishing accessing conditions similar to about the past 15 years and by ensuring future access through maintenance. Access to the Reservoir would not be assured. The primary purpose of the pilot channel would be for “normal flow” conveyance of river flows. The pilot channel would be maintained for flow, and debris would be removed.
- Regional social acceptability would be expected to be low to moderate.
- The potential for economic justification and overall Federal interest would be low. Costs significantly exceed social and economic impacts of no action.
- The effort to construct the alternative would be moderate due to moderate scope, cost, and impacts. Construction and maintenance would utilize standard techniques.
- Environmental sustainability would be moderate due to recurring maintenance and associated moderate environmental impacts. The eventual formation of a new channel would tend to aid fish passage between the Reservoir and the River. The restored fish passage would provide the opportunity to restore annual white bass runs and improve the local economy and fishing success.

**Alternative 4. Clear the logjam from the existing Neosho River channel and dredge through the in-lake mudflat. The assessment of the approach consists of the following:**

- The Jacobs Creek boat ramp would be accessible for river fishing.
- The John Redmond Reservoir would be accessible for fishing and other lake recreation from access points along the Neosho River upstream of the reservoir.
- As needed log clearing maintenance would be required along the Neosho River within the Federal reservoir lands, perhaps annually.
- Deadwood removal requires disposal by chipping, burning, or storage for decomposition. Removal of the current logjam would initially generate about 100,000 cubic yards of woody debris (enough debris to cover 10 acres about 6 feet deep). Future debris removal would require additional storage space as the initial deadwood was processed, dried and burned, or decomposed.

- Restoring the Neosho River channel would require sediment removal within the river channel, channel alignment, and dredging within John Redmond Reservoir where a mud flat has formed. Disposal of about 1 million cubic yards of material would be required. A dredged material disposal area would be required to drain and dry the sediments for reuse as Refuge habitat.
- Hunting access to the Refuge from the Jacobs Creek location would return to near pre-logjam conditions but would be dependent on storage reallocation pool elevations and seasonal pool plan elevations.
- High initial cost of implementation.
- High annual maintenance cost.
- High level of impact to Refuge or overall environment, and maintenance activities would include long-term, high-level recurring impacts during restoration of storage, but would be moderate during maintenance of that storage.
- Low risk of occasional significant accumulation of debris that could temporarily block fishing access at the boat ramp before removal could be completed and in the pilot channel.
- No risk that the Neosho River will become impassible due to new logjams.
- The approach relates to the symptoms of the boat ramp problem but excludes the causes of the problem in the upstream watershed; the approach fully addresses the downstream in-lake sedimentation.
- Potential local acceptability would be high by providing a return to fishing access conditions similar to about the past 15 years in the Neosho River and by ensuring reservoir access.
- Regional social acceptability would be expected to be moderate to high.
- Continued sediment excavation within the Neosho River and at the mud flat location would act to slow the accumulation of sediment in the reservoir, thereby prolonging the resource availability of water supply storage.
- Potential for economic justification and overall Federal interest would be low. Costs significantly exceed social and economic impacts of no action.
- Constructability would be moderate although scope, cost, and impacts are large. Construction and maintenance would utilize standard techniques.
- Environmental sustainability would be low due to recurring river and lake maintenance and associated high environmental impacts. However, maintaining a more effective aquatic connectivity between the Reservoir and upstream River through dredging would be a positive environmental component. Also, by providing a small increase in conservation storage (through mud flat dredging), the approach would provide additional aquatic habitat volume. The quality of the additional habitat that would be restored is not addressed in this report.

**Alternative 5. Clear roughly one half the width of the existing logjam by stacking the removed debris on top of the remaining debris in the channel, dredging through the in-lake mudflat, and initiating an annual dredging program to maintain the river channel. This alternative assumes that the stacked debris would be relatively stable and would not be redistributed during flooding conditions. The assessment of the approach consists of the following:**



- The Jacobs Creek boat ramp would be accessible for River fishing.
- The John Redmond Reservoir would be accessible for fishing and other lake recreation from access points along the Neosho River upstream of the reservoir.
- As-needed log clearing maintenance would be required along the Neosho River within the Federal reservoir lands, perhaps annually.
- Future debris would be placed on the remaining channel debris or immediately landward on the channel bank.
- Restoring the Neosho River channel would require sediment removal within the river channel, channel alignment, and dredging within John Redmond Reservoir where a mud flat has formed. Disposal of about 300,000 to 500,000 cubic yards of material would be required. A dredged material disposal area would be required to drain and dry the sediments for reuse as Refuge habitat.
- Hunting access to the Refuge from the Jacobs Creek location would return to near pre-logjam conditions but would be dependent on storage reallocation pool elevations and seasonal pool plan elevations.
- High initial cost of implementation.
- High annual maintenance cost.
- Moderate level of impact to Refuge or overall environment, and maintenance activities would be long term.
- Moderate risk of occasional significant accumulation of debris that could temporarily block fishing access at the boat ramp before removal could be completed and in the partially restored Neosho River channel.
- Moderate to high risk that the Neosho River will become impassible due to new shifting debris along the channel caused by high river flows or reservoir pool elevations.
- The approach relates to the symptoms of the boat ramp problem but excludes the causes of the problem in the upstream watershed; the approach does not address downstream in-lake sedimentation, except for dredging the in-lake mud flat.
- Potential local and regional social acceptability would be high by providing a return to fishing access conditions similar to about the past 15 years in the Neosho River and by ensuring access between the Reservoir and the River.
- Continued sediment excavation within the Neosho River and at the mud flat location would act to slow the accumulation of sediment in the reservoir, thereby prolonging the resource availability of water supply storage.
- Potential for economic justification and overall Federal interest would be low. Costs significantly exceed social and economic impacts of no action.
- The effort required to construct the alternative would be moderate although scope, cost, and impacts are moderate to large. Construction and maintenance would utilize standard techniques.
- Environmental sustainability would be better than Alternative 3 due to a reduced level of River maintenance and associated environmental impacts. However, maintaining a more effective aquatic connectivity between the Reservoir and River through dredging would be a positive environmental component. Also, by providing a small increase in conservation storage (through the mud flat dredging), the approach would provide additional aquatic habitat volume. The quality of the additional habitat that would be restored is not addressed in this report.

**Alternative 6. Clear the logjam from within the existing Neosho River channel through the in-lake mudflat and initiate a long-term program of dredging to both maintain the river channel and revitalize the reservoir's water resources. The assessment of the approach consists of the following:**

- The Jacobs Creek boat ramp would be accessible for River and Reservoir fishing.
- The John Redmond Reservoir would be accessible for fishing and other lake recreation from access points along the Neosho River upstream of the reservoir.
- The Reservoir sediment accumulation would be removed over a planned long-term period of dredging and storage maintenance; for example, 5% per year.
- As-needed log clearing maintenance would be required along the Neosho River within the Federal reservoir lands, perhaps annually.
- Deadwood removal requires disposal by chipping, burning, or storage for decomposition. Removal of the current logjam would initially generate about 100,000 cubic yards of woody debris (enough debris to cover 10 acres about 6 feet deep). Future debris removal would require additional storage space as the initial deadwood was processed, dried and burned, or decomposed.
- The approach would restore the Neosho River channel through sediment removal, restore the River to Reservoir transition by removal of the in-lake mud flat, and revitalize the reservoir resources through long term sediment removal within the lake. Reservoir dredging would generate about 8,700 acre-feet of silts (enough sediment to cover one square mile about 15 feet deep). Large dredged material disposal areas would be required to drain and dry the sediments. There are opportunities to utilize the material for development of Refuge habitat such as duck ponds, sediment traps, wetland areas, and other habitat features.
- Hunting access to the Refuge from the Jacobs Creek location would return to pre-logjam conditions but would be dependent on storage reallocation pool elevations and seasonal pool plan elevations.
- This alternative would have the highest initial cost of implementation. The long-term implications (100-years or greater) are generally beyond the scope of this report. Restoring the Reservoir's water supply and flood control storage and recreational and aquatic resources would provide long-term benefits to the region. The need for regional water supply could, in the future, force dredging of the Reservoir or construction of a new reservoir.
- This alternative would have the highest annual costs, both during restoration and following restoration when River and Reservoir maintenance continued to preserve the restored resources.
- This alternative would have the highest potential to negatively impact the Refuge or the overall environment due to the volume of dredged material. The alternative may also have the highest potential to positively benefit the Refuge and the overall environment by avoiding the construction of a replacement water supply reservoir and lowering the conservation pool. Maintenance activities would include long term, moderate to high-level recurring impacts.

- There would be a low risk of occasional significant accumulation of debris that could temporarily block fishing access at the boat ramp before removal could be completed and in the pilot channel.
- This alternative assures that a stable Neosho River channel will be maintained, thereby providing lake access. Backwater effects caused by the current logjam restriction would be eliminated.
- The approach relates to the symptoms of the boat ramp problem but excludes the causes of the problem in the upstream watershed. This is the only approach that fully addresses downstream in-lake sedimentation.
- Local and regional acceptability would be high by providing River fishing access, ensuring Reservoir access, and restoring Reservoir resources.
- Continued sediment excavation within the Neosho River and at the mud flat location would act to slow the accumulation of sediment in the reservoir, thereby perpetuating the storage resource availability for water supply.
- The potential for economic justification and overall Federal interest are beyond the scope of this report.
- The effort to construct the alternative would be moderate although scope, cost, and impacts are large. Construction and maintenance would utilize standard techniques.
- Environmental sustainability would be low due to recurring river and long term lake debris removal and dredging maintenance. The associated environmental impacts would be relatively high and recurring. However, without eventual dredging, the aquatic habitat in the Reservoir will continue to decline. Maintaining a more effective aquatic connection between the Reservoir and River would be a positive environmental component. By restoring conservation storage in the Reservoir, significant additional aquatic habitat volume and diversity would be restored. The quality of the additional habitat is not addressed in this report. Restoring conservation pool volume would tend to defer storage reallocation or reverse previous storage reallocations, thereby returning Refuge area covered by the higher conservations pool to terrestrial habitat.

**Alternative 7. Offer voluntary buyout and relocation assistance for Jacobs Creek Landing property owners. The assessment of the approach consists of the following:**

- This alternative would assume that the logjam caused significant negative impacts to the social and economic conditions at the Jacobs Creek Landing.
- Proposing this approach assumes that a buyout option is more economically attractive than other action alternatives.
- The environmental impacts of a buyout are minimal.
- Issues of fish movement between the Reservoir and River are not addressed.
- Issues of future water supply needs and Reservoir aquatic habitat are not addressed.
- Local social acceptability is expected to be mixed and assumed to be low overall.
- Regional acceptability is expected to be low because the logjam, fish spawning, and River access issues would not be addressed.
- Costs would be expected to be relatively low compared to the initial costs of dredging and the long-term costs of maintenance.
- The economic justification is reduced to a determination of the least costly acquisition and relocation alternative acceptable to the property owner or the Courts.

**Alternative 8. Clear a 100-foot wide working area along the south bank of the River and use an excavator and other necessary equipment to remove the logjam from the channel and stockpile the debris along the working area for drying and later burning. The approach would also include dredging of the in-lake mudflat. (Suggested by the Flint Hills Wildlife Management Refuge.) The assessment of the approach would be similar to Alternative 4.**

## **Preliminary Cost Estimates**

The following cost estimates are limited in detail and are presented to facilitate a gross fiscal comparison of alternatives.

The dredging estimates were developed by calculating excavation quantities (whether woody debris, sediment, or excavation of wooded floodplain) times an average excavation and disposal cost of \$4 per cubic yard to form a construction cost. A total estimated cost was developed by including an estimate of formulation, NEPA documentation, engineering and design, and supervision and administration of contracts of 15% times the construction cost, plus contingencies of 25% times the construction cost.

The estimation of quantities is based on information presented herein and on limited field investigations. Quantities are simple rectangular channel estimates with no allowance for expansion, loss, or compaction of excavated materials. Overland haul distances are assumed to be less than 1 mile. Channel excavation is assumed to be accomplished by barge. Soil and sediment disposal for channel excavation is assumed to be placed adjacent to the channel for the purposes of a maintenance road and for the construction of Refuge features such as; wetlands or duck ponds. Woody debris disposal is assumed to be placed along the limits of the floodplain or beyond the floodplain, within the Refuge.

The boat ramp estimates were developed assuming minimal signage, access road, lighting, and parking – similar to existing facilities. A single lane concrete ramp and real estate are estimated based on John Redmond Reservoir ramp costs. No additional maintenance costs were estimated.

Timber clearing was estimated at \$10,000 per acre.

Annual channel maintenance costs are assumed to be \$25,000 per mile of maintained channel (rounded up to the nearest mile. All costs are rounded. Interest during construction was not estimated. The value of money over time for those plans with assumed 20 year implementation plans was not adjusted by the Federal discount rate.

The completion of annual maintenance is contingent on budget limitation and other Reservoir maintenance priorities that compete for available funds on a national level.

Maintenance Measure 1. Remove the logjam in the vicinity of the Jacobs Creek Landing boat ramp. (page 20)

**Assumes 8 acres of woody debris and sediment about 5 feet deep.**

**Total estimated cost is \$370,000, plus \$25,000 annual maintenance**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
65,000	\$260,000	\$25,000

Maintenance Measure 2. Remove the logjam at the mouth of Eagle Creek and construct a permanent access road and boat ramp on Eagle Creek. (page 20)

**Assumes a channel width of 150 feet and a logjam of 300 feet in length, about 6 feet deep, including woody debris and sediment.**

**Total estimated cost is \$180,000, plus \$25,000 annual maintenance.**

Excavation (cu yd)	Ramp Cost	Construction Cost	Annual Maintenance Cost
10,000	(\$50,000)	\$90,000	\$25,000

Maintenance Measure 3. Construct a permanent boat ramp on the Neosho River at Neosho Rapids. (page 21)

**Total estimated cost is \$70,000, plus \$25,000 annual maintenance.**

Excavation (cu yd)	Ramp Cost/Construction Cost	Annual Maintenance Cost
Minimal	\$70,000	\$25,000

Maintenance Measure 4. Develop and implement a long-term (20 year) Neosho River debris and sediment removal plan. (page 21)

**Assumes a logjam length of about 2 miles (about 5 feet deep over 70 acres), including sediment about 2 feet deep in the channel and lake entrance.**

**Total estimated cost is \$3.3 million, plus \$50,000 for annual maintenance (starting in year 21).**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
565,000	\$113,000 (Year 1) \$113,000 (Years 2-20)	\$50,000 (Years 21-50)



Alternative 1. Clear the Neosho River logjam in the vicinity of the Jacobs Creek boat ramp to a location downstream on the Neosho River (for example, 200 yards downstream). To provide a temporary storage area for future debris while minimizing the initial costs of removal, allow a new River channel to form. (page 21)

**Assumes additional debris collection prior to implementation, resulting in 18 acres of woody debris and sediment about 5 feet deep.**

**Total estimated cost is \$1 million, plus \$50,000 for annual maintenance.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
145,000	\$580,000	\$25,000

Alternative 2. Excavate a pilot channel to the Reservoir avoiding the logjam. Extend the pilot channel through the in-lake mudflat by dredging. Leave the balance of the logjam in place and abandon the Jacobs Creek boat ramp. (page 23)

**Assumes an 8-foot-wide pilot channel about 3 feet deep and about 3 miles long, including dredging through the mudflat. Live trees along the pilot channel would require removal for a width of about 300 feet and a length of 1.5 miles. Assume tree removal and disposal cost is \$454,000, included in construction cost below.**

**Total estimated cost is \$730,000, plus \$75,000 for annual maintenance.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
14,000 sediment	\$510,000	\$75,000

Alternative 3. Clear the Jacobs Creek Landing ramp and downstream reach and create a pilot channel into the lake, dredge through the in-lake mudflat, but leave the balance of the logjam in place. (page 25)

**Assumes additional debris collection prior to implementation, resulting in 18 acres of woody debris and sediment about 6 feet deep.**

**Assumes an 8-foot-wide pilot channel about 3 feet deep and about 3 miles long, including dredging through the mudflat. Live trees along the pilot channel would require removal for a width of about 300 feet and a length of 1.5 miles. Assume tree removal and disposal cost is \$454,000, included in construction cost below.**

**Total estimated cost is \$1,570,000, plus \$75,000 for annual maintenance.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
159,000	\$1,090,000	\$75,000

Alternative 4. Clear the logjam from the existing Neosho River channel and dredge through the in-lake mudflat. **(page 26)**

**Assumes a 220-foot-wide channel about 3.2 miles long (85 acres 5 feet deep), includes dredging through the mudflat (an additional 75 acres 3 feet deep).**

**Assumes management and contingencies of \$1 million.**

**Total estimated cost is \$5,200,000, plus \$100,000 for annual maintenance.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
1,050,000	\$4,200,000	\$100,000

Alternative 5. Clear roughly one half the width of the existing logjam by stacking the removed debris on top of the remaining debris in the channel, dredge through the in-lake mudflat, and initiate an annual dredging program to maintain the river channel. **(page 27)**

**Not estimated due to risk of failure.**

Alternative 6. Clear the logjam from within the existing Neosho River channel through the in-lake mudflat and initiate a long-term program of dredging to both maintain the river channel and revitalize the reservoir's water resources. **(page 29)**

Assumes the removal of 8,700 acre-feet of sediment, plus the debris and sediment in the Neosho River channel of about 550,000 cubic yards.

**Assumes management and contingencies of \$6 million.**

**Total estimated cost is \$65 million, plus \$200,000 for annual maintenance after a 20-year rejuvenation plan.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
14.7 million	\$9 million	\$200,000

Alternative 7. Offer voluntary buyout and relocation assistance for Jacobs Creek Landing property owners. **(page 30)**

**Not estimated due to the required detail of real estate appraisals.**

Alternative 8. Clear a 100-foot wide working area along the south bank of the River and use an excavator and other necessary equipment to remove the logjam from the channel and stockpile the debris along the working area for drying and later burning. (page 31)

**Assumes a 220-foot-wide channel about 3.2 miles long (85 acres 5 feet deep), includes dredging through the mudflat (an additional 75 acres 3 feet deep).**

**Assumes a 100-foot-wide working area along the south side of the existing channel would be cleared (about 1.5 miles long and 18 acres) at a cost of \$180,000.**

**Assumes management and contingencies of \$1 million.**

**Total estimated cost is \$5,400,000, plus \$100,000 for annual maintenance.**

Excavation (cu yd)	Construction Cost	Annual Maintenance Cost
1,050,000	\$4,400,000	\$100,000

## Recommendations

I find that the requirements for modification of existing projects established by Section 216 of the 1970 Flood Control Act and implemented by ER 1105-2-100 and ER 1165-2-119 are not met by the existence or conditions that may be created by the logjam in the Neosho River at John Redmond Reservoir. Other than the loss of boating access at the Jacobs Creek Landing, there are no significant water resources impacts at the John Redmond Reservoir. There are no anticipated significant effects on storage or flood control operations. There is no evidence that conditions created by the logjam will cause increased flooding on real estate interests outside of project lands. Environmental conditions in the river and floodplain are anticipated to be altered, but these changes will be consistent with other naturally occurring logjams and are not considered to pose a human health risk. Therefore, the long-term alternatives considered herein are not appropriate for recommendation to Congress for modification of the John Redmond Dam and Reservoir in regard to the Neosho River or Eagle Creek logjams under Section 216 of the 1970 Flood Control Act.

I find that the Kansas Watershed Restoration and Protection Strategy for watershed planning and management is consistent with the Corps' environmental operating principles and doctrine. I recommend that this and other state programs are considered in our activities, studies, and projects to minimize or avoid future water resources impacts, including logjams in Kansas.

I find that the maintenance measures described herein are within the authority of the project. I have prioritized the maintenance measures as follows:

- Maintenance Measure 3 – Construct and maintain a public access and boat ramp in the vicinity of Neosho Rapids. The loss of Neosho River access from the Jacobs Creek Landing and temporary Eagle Creek boat ramp leaves the Hartford ramp as the only public access to the fishing and recreation resources of the Neosho River within the John Redmond project lands managed by the U.S. Fish and Wildlife Service as the Flint Hills National Wildlife Refuge. Future logjams could continue to close the Jacobs Creek Landing and Eagle Creek access to the Neosho River. Construction of a Neosho Rapids access point will provide long-term access to the Neosho River with a relatively low risk of impact from logjams. The preliminary estimated cost is \$70,000, plus \$25,000 for annual maintenance.
- Maintenance Measure 1 – Remove the logjam in the vicinity of the Jacobs Creek Landing boat ramp. Clearing the logjam at this location will allow recreation access to the Neosho River and Refuge. There is a significant risk that the ramp will again be closed by additional debris. The preliminary estimated cost is \$370,000 initially, plus \$25,000 for annual maintenance.
- Maintenance Measure 2 – Remove the logjam at the mouth of Eagle Creek and construct a permanent boat ramp on Eagle Creek to restore recreation access to the Neosho River and Refuge. An expansion of the Neosho River logjam to a point upstream of the mouth of Eagle Creek would preclude further clearing of the Eagle Creek logjam. Continued maintenance of the Eagle Creek access point would provide fishing and hunting access to

the Refuge. The preliminary estimated cost is \$180,000 initially, plus \$25,000 for annual maintenance.

- Maintenance Measure 4 – Develop and implement a long-term Neosho River debris and sediment removal plan for water resources and environmental management, regional economic development, preservation and/or restoration of water supply and flood control storage, and regional recreation resources. The preliminary estimated cost is \$3.3 million initially, plus \$50,000 for annual maintenance starting at the end of construction.

I recommend that the District's budget preparation for Fiscal Years 2007 through 2012 include Maintenance Measure 3 for implementation. Annual program maintenance and fiscal priority decisions made at the national level may not allow these efforts to be included in the Corps' approved budget.

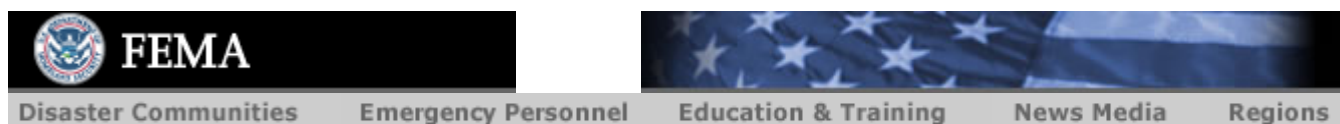


Miroslav P. Kurka  
Colonel, U.S. Army  
District Engineer

*The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.*



## Enclosure 1



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# Disasters

Information on Federally Declared Disasters

## Designated Counties for Kansas Ice Storm

Disaster Summary for FEMA-1402-DR, Kansas

Declaration Date:  
February 6, 2002

Incident Type:  
Severe Winter Ice Storm

Incident Period:  
January 29, 2002 through February 15, 2002

Counties Declared and Types of Assistance as of February 6, 2002:

INDIVIDUAL ASSISTANCE (Assistance to families and individuals):

Allen, Anderson, Barber, Bourbon, Butler, Chautauqua, Coffey, Cowley, Crawford, Douglas, Elk, Franklin, Greenwood, Labette, Linn, Miami, Montgomery, Neosho, Osage, Sumner, Wilson, and Woodson for Public Assistance (already designated for Individual Assistance).

PUBLIC ASSISTANCE (Assistance to State and local governments for the repair or replacement of disaster-damaged public facilities):

Johnson and Wyandotte Counties for Public Assistance, including direct Federal assistance at 75 percent Federal funding.

HAZARD MITIGATION GRANT PROGRAM (Assistance to State and local governments for actions taken to prevent or reduce long term risk to life and property from natural hazards):

All counties in the State of Kansas are eligible to apply for assistance under the Hazard Mitigation Grant Program.

Additional designations may be made at a later date after further evaluation.

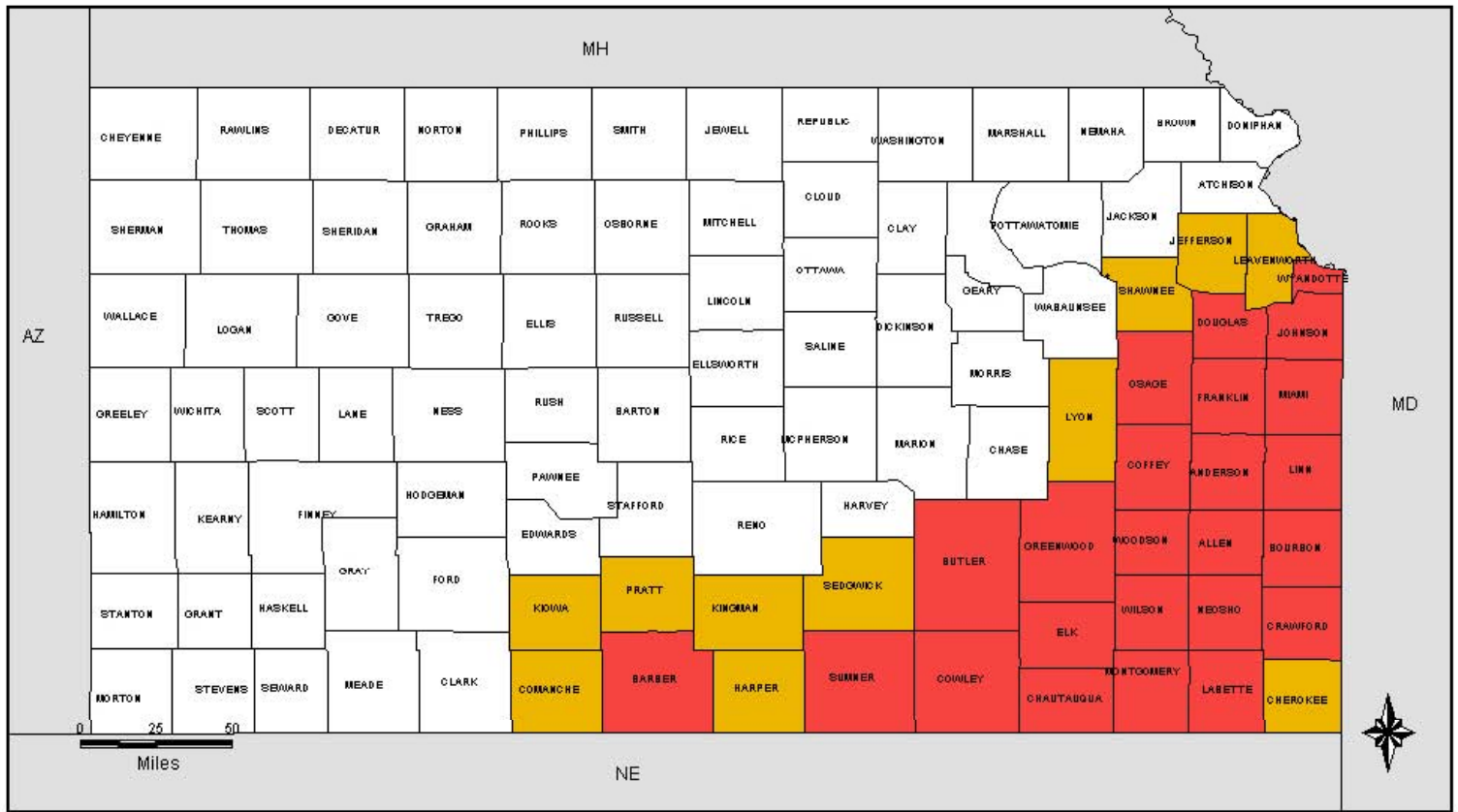
► [More information about Kansas Ice Storm](#)

***Last Updated: Wednesday, 27-Oct-2004 16:21:05***

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# FEMA-1402-DR, Kansas As of February 14, 2002



Location Map



Legend

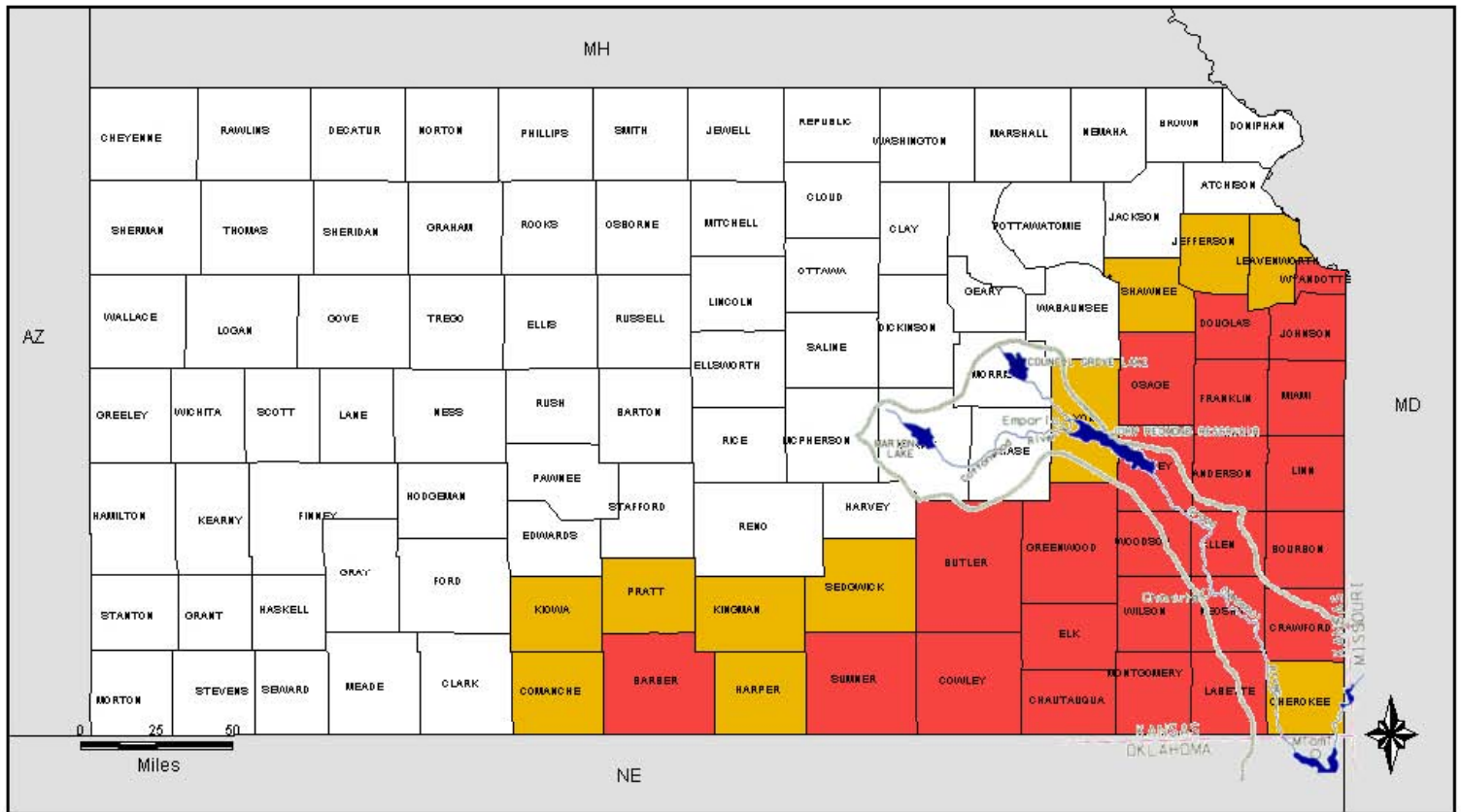
Designated Counties by Assistance Type

- Yellow box: Individual Assistance (IA) (11)
- Red box: IA and Public Assistance (24)

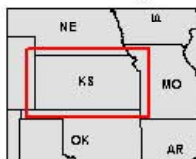


Information Coordination Unit  
Washington, DC  
20020216 -- 2400 EST 1402.mex

# FEMA-1402-DR, Kansas As of February 14, 2002



**Location Map**



**Legend**

Designated Counties by Assistance Type

- Individual Assistance (IA) (11)
- IA and Public Assistance (24)



Information Coordination Unit

Washington, DC

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Neosho Basin outline is approximate.

## Enclosure 2



# Ecological Issues Evaluation Results of the Jacob's Creek Landing Neosho River Log Jam

Scott L. Satterthwaite, KDHE BOW WMS- 9/16/04



# FIELD RESPONSE TO SERVICE REQUEST

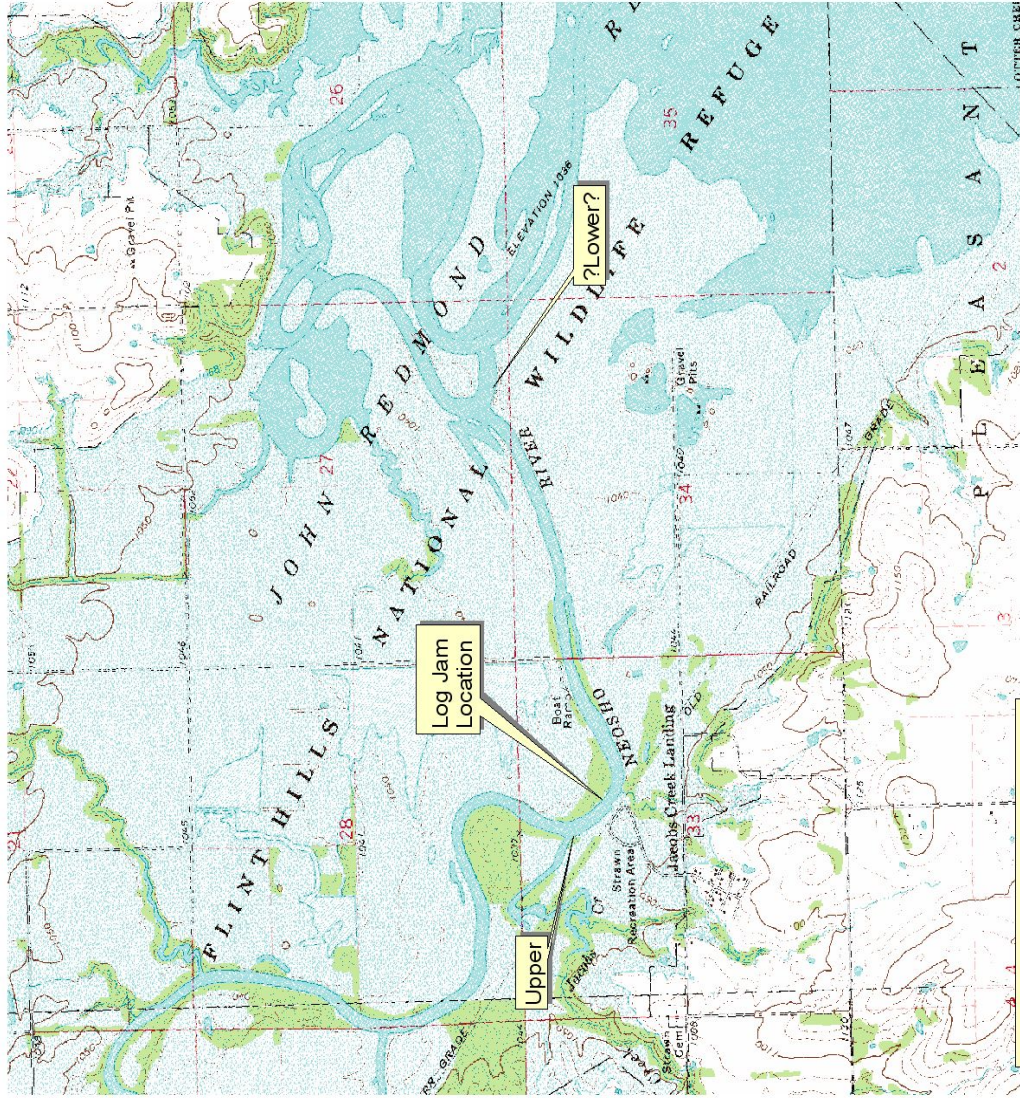
- July 23, 2004- KDHE and DWR made a site visit.

## Observations included:

- Boat ramp was un-useable.
- 55 gallon drum, cooler and small gallon container.
- Water still flowing in/out of the area indicated by stranded forage fish, water moving through ditches, over roads, etc.
- Wildlife feeding in floodwater next to US Fish and Wildlife Refuge road to Strawn Flats.
- Fish surfacing and feeding on or between logs.
- Woody debris varied in size from branches to trunk logs.



Log jam  
UFWS

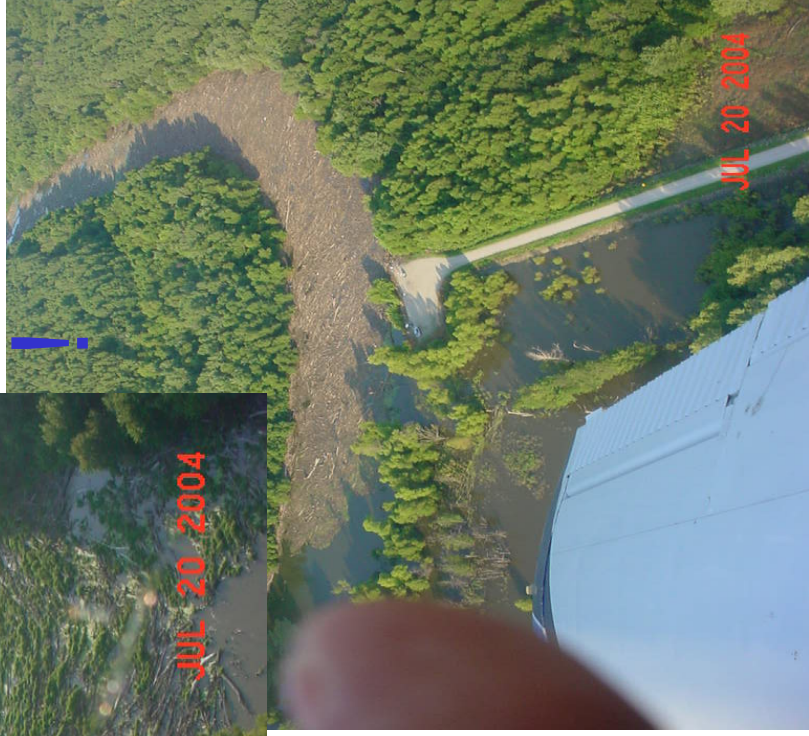


Hartford & Ottumwa, KS Quads  
(Twp 20 S, Rng 14 E)





UN-  
BELIE  
VABLE



ARE WE  
REALLY IN  
KANSAS?

# FOLLOW-UP

Facts gathered and reported back to the agency.

- COE owns floodplain, boat ramp. USF&WS manage floodplain for wildlife.
- The log jam phenomenon has been occurring over several decades.
- It should have been handled by the COE sooner.
- This is just the succession of a floodplain
- There were livestock carcasses observed earlier along with barrels, refrigerators etc.
- Mosquitoes are increasing and West Nile Virus concerns are increasing.
- Land clearing, farmers pushing trees to plant crops, WLR wildlife habitat management practices all contributed.

# Mosquitoes and West Nile Virus

- Aug 10th Survey by KSU
  - KDHE recognizes flood conditions
  - Likelihood of habitat created by receding water is apparent.
  - Confident in the KDW&P and US F&W's conclusion.
  - Mosquito fish will control populations
    - Life cycle follows that of the mosquito
    - Tolerant of low oxygen conditions
    - Other predators will contribute to the population control



# ACTIONS TAKEN

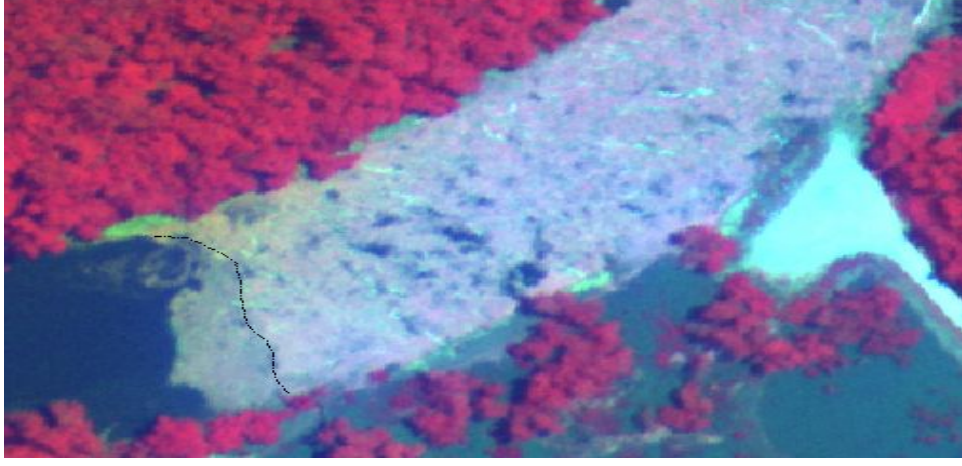
KDHE WMS hired Kansas Biological Survey  
Kansas Applied Remote Sensing (KARS)  
Program

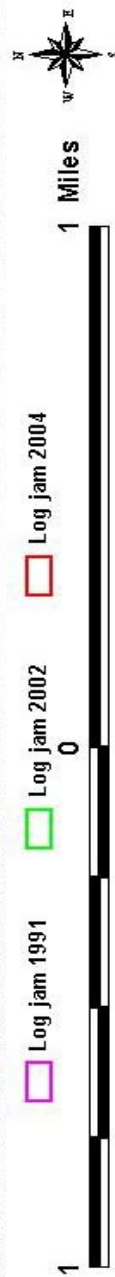
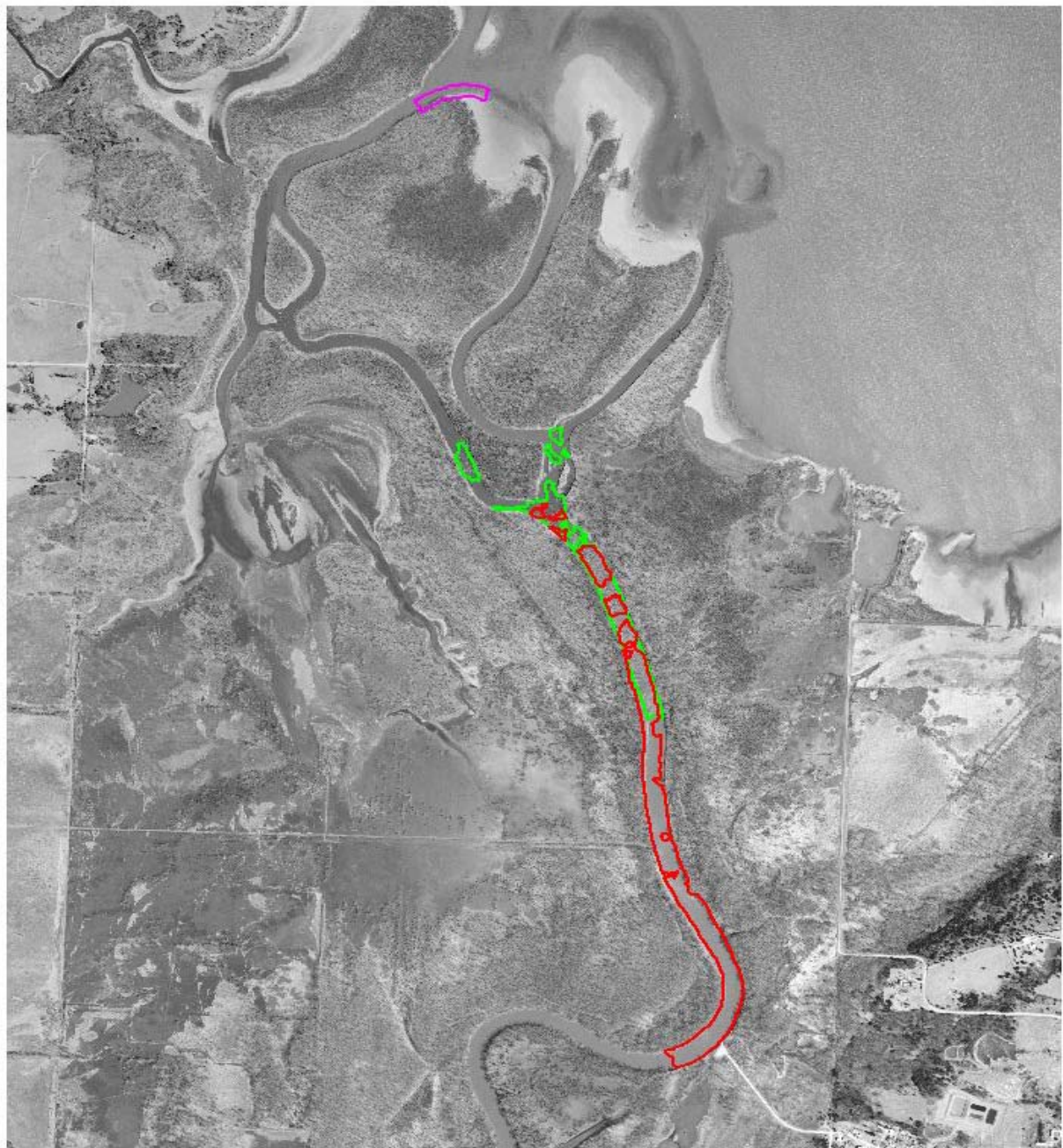
- Flight included the floodplain impacted by the log jam
- Produce aerial imagery  
.5 sq. meters resolution
- Use in lab spectral band reflectance processing Identify solid waste
- Evaluate riparian conditions and management

# RESULTS

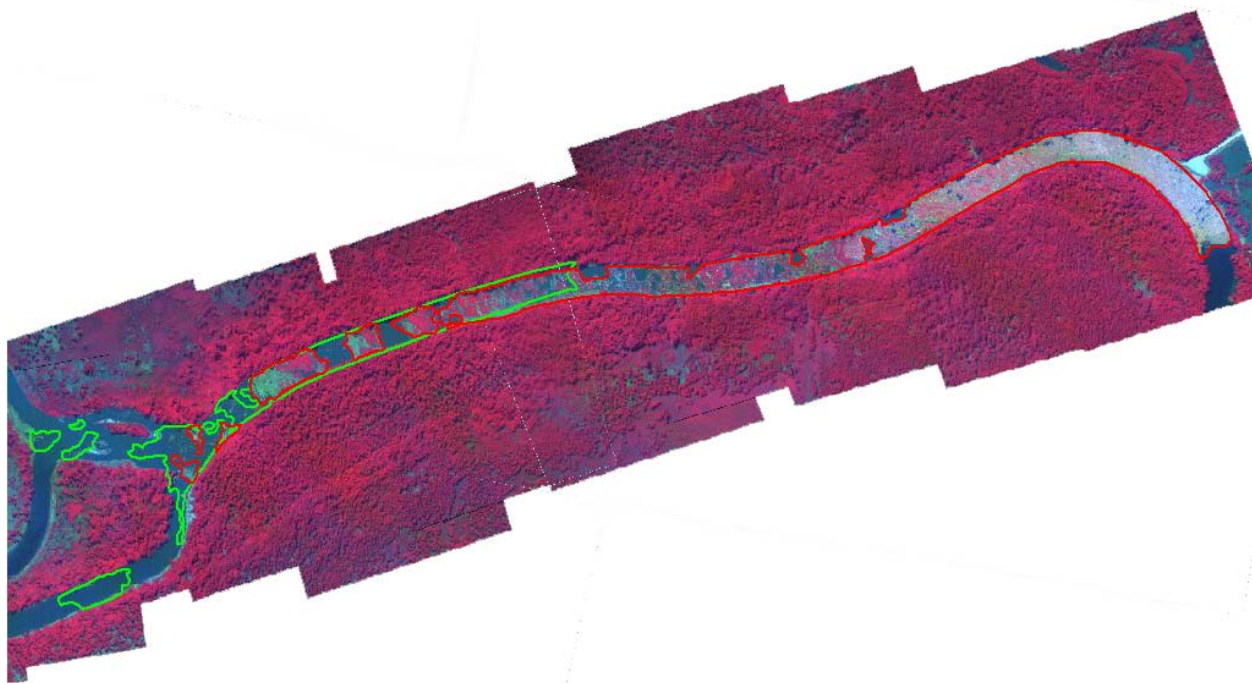
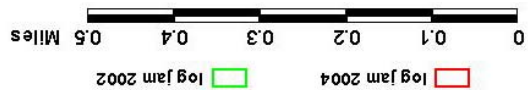
- The jam is expanding

Figure 2. Image from August 2004 with a patch of relatively newly deposited debris shown above the black line.





Background: Near Infrared false color  
composite from airborne multispectral  
camera, August 17, 2004



# RESULTS CONTINUED

- Identified 63 items considered to be solid waste including. (non-natural material).
- An estimation of the solid waste concentration is approximately 1 item per 18,604 sq. ft.
- There is no evidence of a concentration of waste items.

# RESULTS CONTINUED

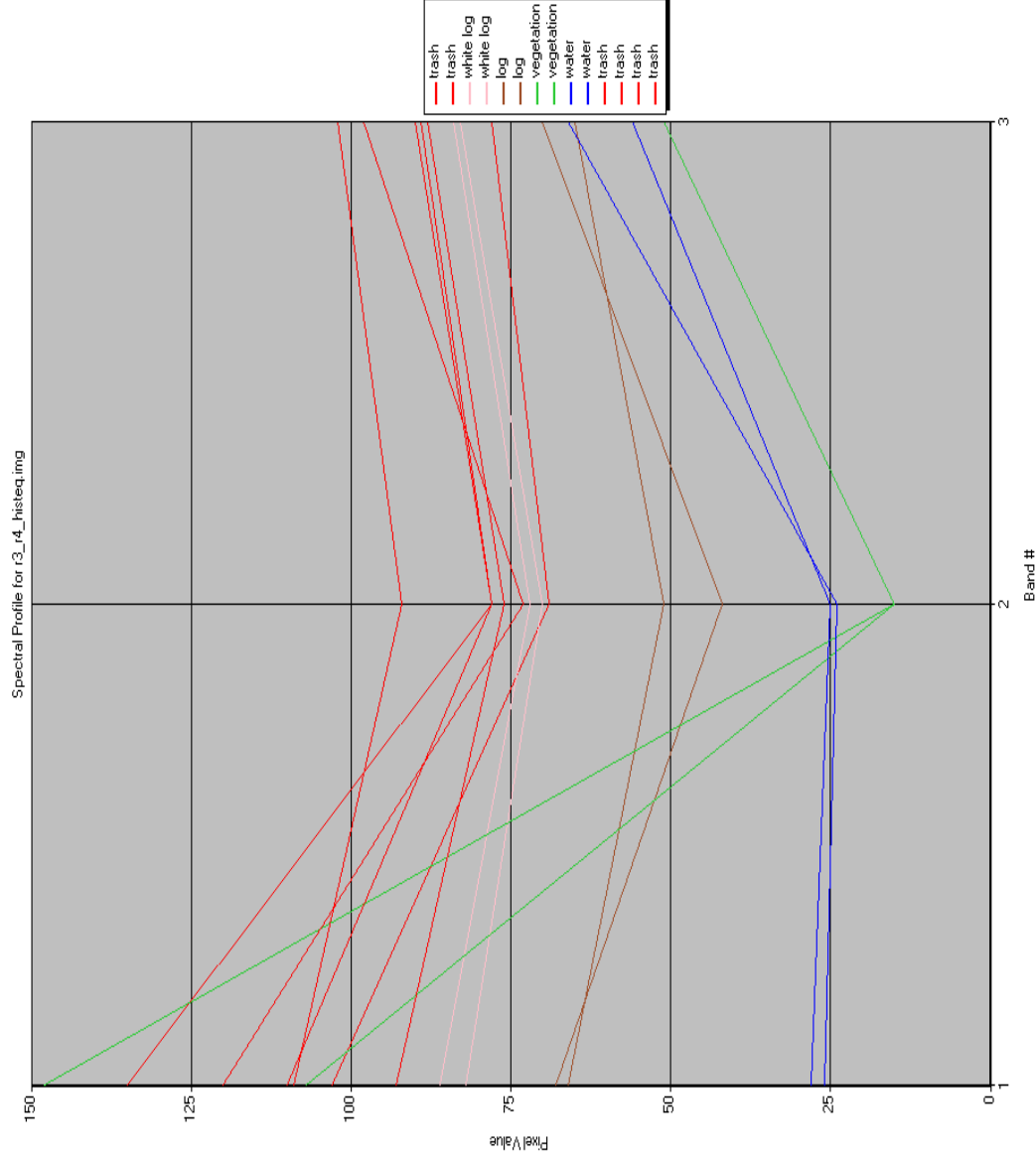


Figure 3. Graph showing the amount of reflectance (vertical axis) of each of the three spectral bands of the DuncanTech camera. Note how each type of feature has a unique reflectance pattern: Red = SW, pink=bright logs, brown = common log, blue = water, green = vegetation.



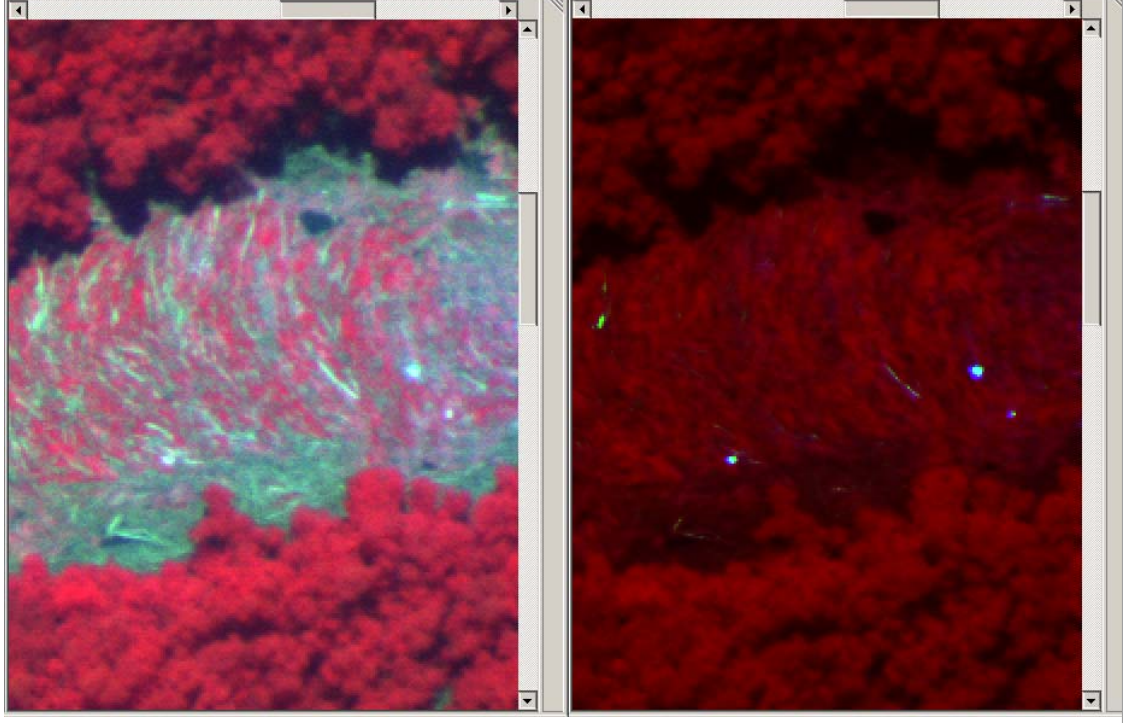
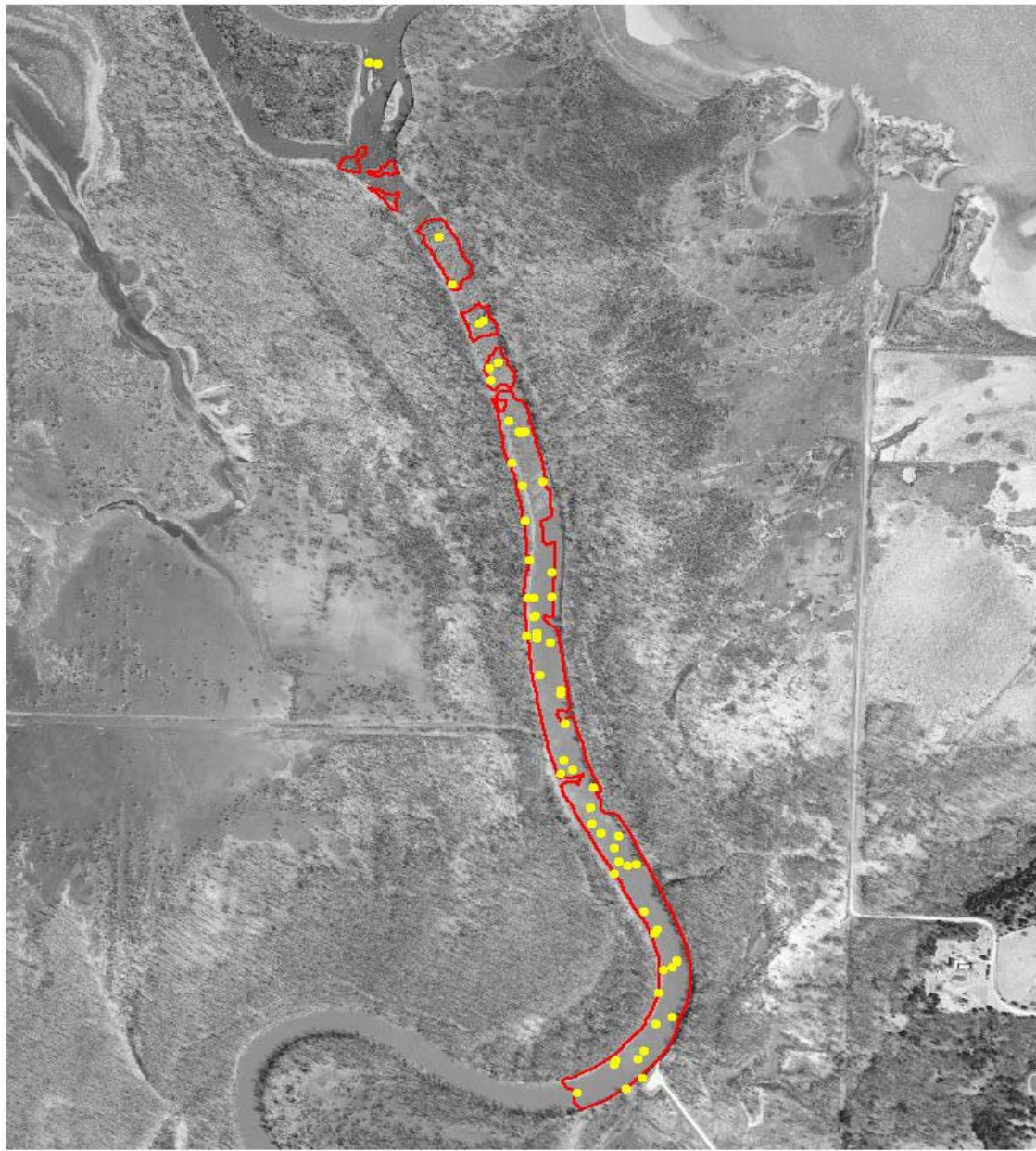
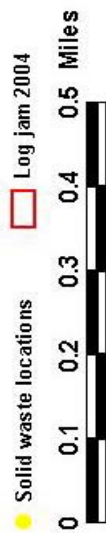


Figure 4. Two view of DuncanTech imagery used to identify non-natural debris points. The top image shows the original imagery used to visually identify SW, while the lower image shows the same area, but after adjusting the brightness of the red and blue bands to highlight the highly reflective debris.



Background: DOQQ photograph  
February 2, 2002



# REPORT CONCLUSIONS

- The assumption is there were no major illegal dumps involved.
- Little evidence the solid waste issue poses any higher of a health threat than the usual trash in our waterways.
- It is difficult to discern riparian management conditions using this technology. Trees and canopy cover makes it difficult to view downed trees, woody debris or dead stands of timber

# RECOMMENDATIONS

- Presented Recommendations to Sub-Cabinet of Natural Resources.
- Short-Term:
  - Coordinate with COE on the log jam study
    - Contact COE for details
  - Consider additional state action based on the study findings.
- KDHE report to provide to local stakeholders
  - Potential health risks
  - Riparian conditions and management trends

# RECOMMENDATIONS

## CONTINUED

- Long Term:
  - Tap into the WRAPS for financial and technical assistance. This can include but is not limited to
    - Conservation buffers
      - Timber management and harvesting
      - Solid waste and litter issues
  - KDHE has conferred with the State Forester
    - Inventory general timber stand using aging techniques.
    - KDHE will draft a letter requesting assistance.

## Enclosure 3



# **Project to Remove the Neosho River Logjam at the Entrance to John Redmond Reservoir**





# **Project to Remove the Neosho River Logjam at the Entrance to John Redmond Reservoir**



## **Introduction**

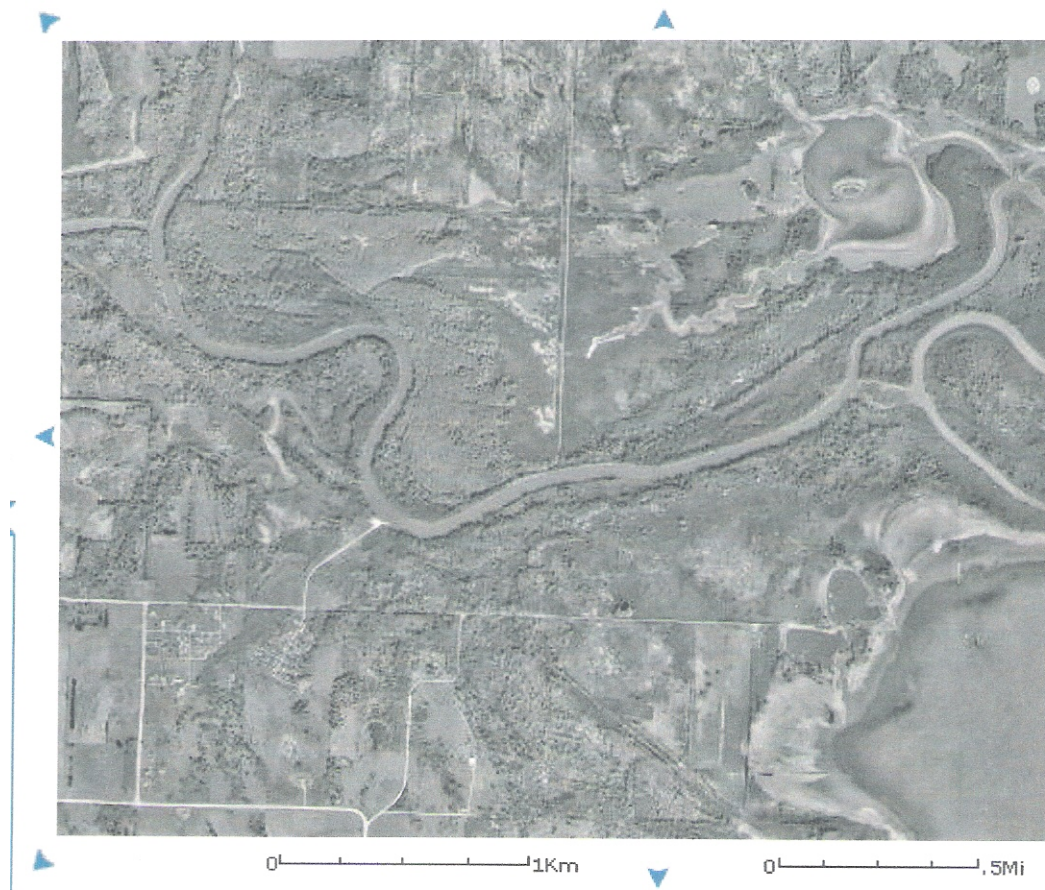
Over 10 years ago, a raft or logjam began forming where the Neosho River, the main tributary, flows into the John Redmond Reservoir near Burlington, Kansas. Besides being the principal flood control on the Cottonwood and Neosho Rivers, this reservoir is the backup water supply for the Wolf Creek Nuclear Power Plant. Flooding on the Cottonwood and Neosho Rivers this spring proved that this logjam is permanent. The logjam is now about one and one half miles long and threatens to backup the whole river. It is likely that the obstruction caused by this significant raft of logs will change the course of river in the near future. Already, the river water elevation upstream from the logjam is increasing and flooding the adjacent national wildlife refuges. Two other smaller, but significant, rafts of logs upstream could release under high river flows and trigger this sudden change in the course of the Neosho River upstream from this primary logjam at the entrance to the John Redmond Reservoir.

Historically, logjams as significant as this one found above John Redmond Reservoir do not naturally dislodge over the course of time. For instance, a raft of logs on the much larger Red River in Louisiana grew over three centuries upstream until it reached 160 miles in length. It extended into Texas and changed the course

of the river in numerous places, creating serious flooding and permanent swamps like Caddo Lake. After many unsuccessful efforts by others, Henry Shreve in the 1830s, using special steam-powered snag boats, dislodged the whole 160 miles, opening up river traffic to Texas. Shreveport, Louisiana, is named after his base camp for this monumental feat. The United States government has actively pursued a policy of dislodging logjams to prevent the progressive accumulation of these river obstructions. This policy prevents the disastrous environmental and financial losses caused by the growth and eventual removal of these rafts of logs on rivers. In the case of the raft above John Redmond Reservoir, the immediate removal of the logjam can prevent the destruction of the present national wildlife refuge and the flooding of the village of Jacob's Creek. This preemptive raft removal will also save the eventual costly removal of a much larger logjam or the construction of a new channel for the Neosho River.

### Scope of Project

Three surveys were conducted to essay the scope and conditions of the raft of logs just above the entrance of the Neosho River into Redmond Reservoir. Below are older satellite images and several aerial photos taken on Friday, August 20, 2004. The lake level appears to be about four feet down from the normal level of the lake.



**Satellite Image from 1991 shows no blockage on Neosho River**





**Silted mouth of Neosho River into John Redmond Reservoir with a 90 degree turn.**

**The first of a series of aerial photos show that entrance of the river into the reservoir is seriously silted in and the flow is forced to make a 90 degree turn to enter the lake.**



**One half mile of river channel near mouth with little log debris.**

**From the mouth upstream, there is about a half mile stretch which is nearly clear of snags or debris. About a half mile from the mouth, there is side channel. From the side channel upstream on the main channel, debris and a partial logjam begins to appear for several hundred yards until a second side channel appears.**



**A satellite view shows both side channels off the main channel at the top of photo. These side channels appear to be an original oxbow of the Neosho River.**

**At their other ends, both side channels are cut off from each other and presently dead end into silt barriers which also prevents them from entering the lake at the present lake water levels.**





**Looking upstream from the lower end of the Neosho River logjam.**

**Upstream from the upper side channel, the logjam becomes generally solid on the main channel across the whole width of the river. New vegetation is growing in part of the logjam. The logjam appears to be one and half miles long past the boat ramp on the river at Jacob's Creek.**

**A ground survey was made the same afternoon of August 20, 2004, of the boat landing at Jacob's Creek.**





**The above photos show that the upper end of the logjam covers the full width of the river and totally blocks the boat ramp from both upstream and downstream**



access. The upper end of the raft appears to be several hundred yards upstream from the boat ramp.

The third survey was made Saturday, August 28, 2004, by airboat to the downstream area of the logjam and by vehicle to the Jacob's Creek boat ramp at the upper end. A Global Positioning System (GPS) was used in coordination with taking physical depths of the water to build a bathymetric picture of the river channel, the river entrance into the lake, and the lake itself. Data supplied by the United States Corps of Engineers revealed that the lake level is not below normal lake or conservation pool levels, contrary to our observations on the first aerial survey. In fact, the reservoir level on both August 20 and August 28, 2004 is almost exactly at the normal or conservation pool level of 1037 feet above sea level. The entrance of the Neosho River into John Redmond Reservoir is less than one foot deep which would pose serious difficulties for logs and debris to exit through the river mouth and to enter the lake under the present river flows and normal lake levels.



**Launching of the Airboat near John Redmond Dam**



**John Redmond Reservoir showing debris snags from the shallow bottom**





**Channel without debris below the logjam near lake entrance of Neosho River**



**Lower end of logjam on Neosho River**



**View from airboat of silt in Neosho River logjam**

**The above photos were taken on the lake, at the entrance, at various points downstream of the main body of the logjam, and at the Jacob's Creek boat ramp.**

**Some of the conclusions of this survey are:**

- (1) The GPS confirmed that the length of the logjam is over one and one half miles in length, the partially obstructed channel length just below the jam is about one quarter of a mile, and the next clear river section to the channel entrance into the lake is one half a mile.**
- (2) The lake itself is very shallow with maximum of only 4 to 5 feet of depth nearly a mile and one half in every direction from the Neosho river entrance into the lake at this normal lake level.**
- (3) The river channel itself from the Jacob's Creek boat ramp to its entrance into the reservoir varies from 3-6 feet in water depth, except where silt has collected in some of the logjam, resulting in no water depth. Other places near Jacob's Creek have water depths of over 10 feet.**



## **Conditions and Costs of Project**

A rough estimate of the quantity of wood to be removed is between 80,000 and 120,000 cubic yards. Ninety-five percent of this must be removed to be considered effective. Several collection and burn areas need to be supplied by the Corps of Engineers to remove and burn these logs along the length of the logjam. A good access route back to Jacob's Creek needs to be established to conduct the operations. The lake level needs to be raised three to four feet above the present multipurpose level for these project operations. The operations need to be carried out when the weather is above freezing and without ice conditions. There will need to be silt disposal sites possibly during the dislodgement and certainly during the dredging operations for silt removal from the river and lake. The project should be done on a design-build basis with the competitors proposing turn-key projects for evaluation and bid selection.

Three options can be considered:

- (1) The logjam would be dislodged and the freed logs placed and entrapped by berms or levees in the two side channels. After dislodgement, the logs would be ferried into the side channels and substantial berms would be placed at each end of the side channel to encapsulate the debris. A cost estimate for this option would be \$ 1.0 million to \$ 1.5 million.
- (2) The logs in the raft would be dislodged and ferried to several points on the side of the river channel. There a crane or large backhoe would remove them from the water and a loader would stack them into separate piles for burning. A cost estimate for this option would be \$ 1.5 to \$ 2.2 million.
- (3) In addition to doing option 2, dredging would be done at the entrance of the Neosho River into the reservoir to open up the entrance and to create a large silt basin to intercept the river silt from moving into the rest of the lake. This would probably involve removing 1 million cubic yards of silt and original material at the river entrance to create this in-lake basin. A cost estimate for this logjam removal and dredging of 1 million cubic yards would be \$ 5.5 million to \$ 8.0 million depending on the type of dredge material.

Options 1 and 2 would probably take 6 to 8 months to complete and option 3 would probably take 18 months to 24 months to complete.

Respectfully,

David Penny  
President  
The Master's Dredging Company, Inc.





## Enclosure 4

## **WATERSHED RESTORATION AND PROTECTION WATER ISSUE STRATEGIC PLAN SUMMARY**

**ISSUE SUMMARY:** Watershed restoration and protection efforts are needed to address a variety of water quality and water resource concerns such as achievement of Total Maximum Daily Loads, protection of public water supply reservoirs, and protection or restoration of wetland and riparian habitats. Each day Kansas' water resources are assaulted with water pollution, eutrophication and sedimentation to the extent that our expectations of these resources are not being met. Over the years, Kansas and the federal government have initiated a variety of programs and activities to protect and restore water resources. While each of these programs and initiatives is meritorious, their full potential has not been reached. The Watershed Restoration and Protection strategic plan initiative is intended to address this gap.

While Kansas is blessed with both surface and ground water, the large Federal reservoirs as a group represent an especially important component of Kansas' water. These reservoirs provide drinking water to communities that collectively serve over a million persons, account for millions of recreational visits annually, provide flood protection for major population centers, and support aquatic life and wildlife habitat. Sedimentation and eutrophication are major resource concerns that threaten the useful life of our reservoirs. Because of the complex interrelationships of hydrology, soils, culture and watershed morphology, a specific action plan for each individual reservoir and its watershed is necessary.

The Watershed Restoration and Protection Strategy (WRAPS) approach is intended to provide a framework to 1) provide a means of engaging all stakeholders of a watershed in a collaborative process of identifying watershed restoration and protection needs, establishing management goals and selecting a cost effective plan to achieve the goals, and 2) provide a report that documents the decisions of the watershed stakeholder team concerning goals, the action plan and the resources required to execute the action plan.

This following strategic plan is proposed to facilitate a collaborative relationship among state, federal, local government and private sector interests so that available and enhanced financial and technical assistance resources are directed to the priority water resource needs of the citizens of Kansas. Figure 1 illustrates this proposed process.

**GOAL:** Develop and implement local watershed restoration and protection strategies in priority areas.

### **OBJECTIVES AND STRATEGIES:**

1. Establish a unified interagency protocol for developing WRAPS that assures proper and sustainable watershed function.
  - Define the process for developing a local WRAPS
  - Establish criteria defining proper and sustainable watershed function
  - Develop tools needed to interpret data and observations, identify watershed

restoration and protection needs, and cost effective implementation actions

**Proposed Timeline:** February – July 2004

2. Implement local watershed restoration and protection strategies on the basis of watershed priority.
  - Establish criteria and develop a methodology for determining watershed priority for WRAPS development and implementation
  - Utilize priority areas in targeting state and federal program resources

**Proposed Timeline:** February – August 2004

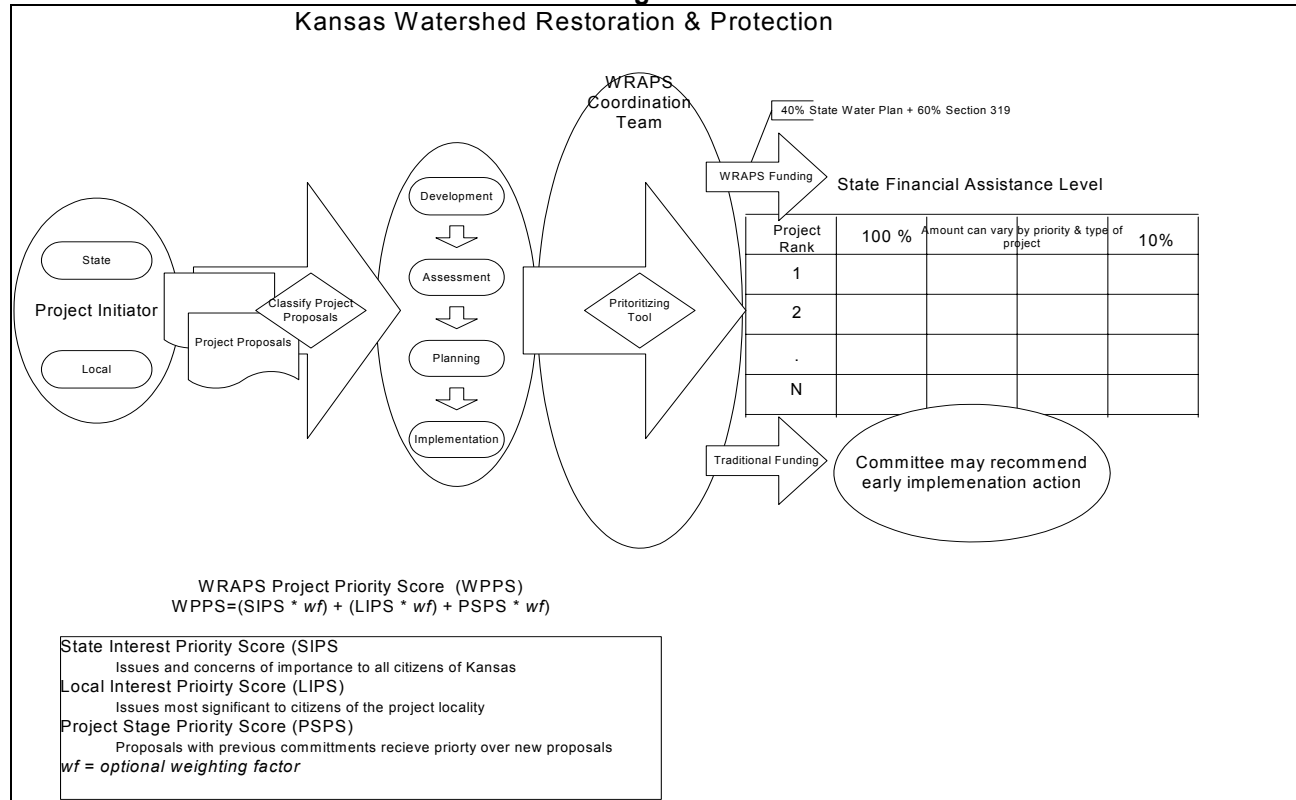
3. Assure adequate resources to implement local WRAPS in priority areas.
  - Establish a WRAPS Coordination Team to assure effective communication and coordination
  - Establish unified state leadership interagency agreements and coordination of state budgets
  - Partner with state associations to promote WRAPS development and implementation
  - Empower local leadership through education and training
  - Provide priority-based funding for technical and financial support for local WRAPS development and implementation
  - Evaluate local and state authorities and programs for WRAPS implementation and recommend additional authorities and/or programs as needed

**Proposed Timeline:** May 2004 – ongoing

**WISP Agencies:** KDHE, KWO, SCC, KDWP, KDA/DWR, KSU Research & Extension, NRCS, COE

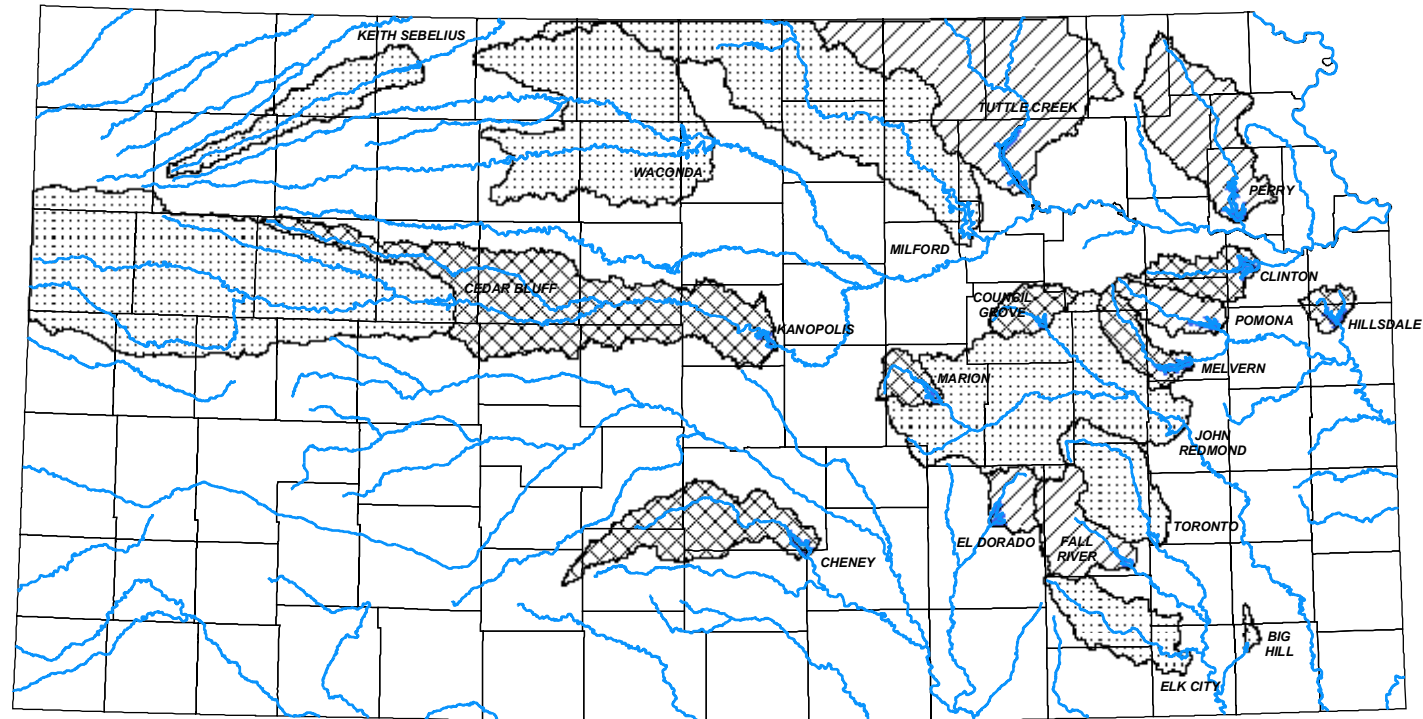
**Figure 1**

**Kansas Watershed Restoration & Protection**





Watershed Restoration & Protection WISP Projects	Agency	FY05 Base Budget	New FY 05 Funding			FY06 Base Budget	New FY 06 Funding <sup>3</sup>			Comments
			SWPF	SGF	Other		SWPF	SGF	Other	
Priority Watershed Projects <sup>1</sup>	KDHE (WISP Agencies)	(see note <sup>2</sup> )				\$1,200,000 <sup>3</sup>	\$800,000		<sup>4</sup>	Funding based on matching State Water Plan Funds (40%) with EPA Section 319 Grant Funds (60%).
Web-based Watershed Coordination Project	KWO (DASC)	\$11,000					\$2,000			
<b>Total New Fund Requests</b>		<b>\$11,000</b>				<b>\$1,200,000</b>	<b>\$802,000</b>			
<b>Notes:</b>										
<sup>1</sup> Initial priority projects include watersheds above federal reservoirs serving public water supply functions (See figure below). Budget estimates are based on needs for WRAPS development, assessment, planning and implementation. Preliminary estimates for FY 06: Development - \$522,220; Assessment/Planning-\$486,509; Implementation-\$807,752 (balance of funding for priority projects in other watersheds). Further prioritization and refinement of project costs will be undertaken as outlined in the strategic plan.										
<sup>2</sup> Work ongoing in some watersheds with EPA Clean Water Act Section 319 grant funds, SCC programs and other programs.										
<sup>3</sup> EPA Section 319 Grant Funds from State's Annual Allocation										
<sup>4</sup> Additional local funding anticipated for specific watershed projects.										




## Watersheds of Federal Lakes Serving Public Water Supply Needs



### Legend

-  Streams
-  Federal Lake w/ PWS

### WRAPS\_FY06\_Status

-  Development
-  Assessment/Planning
-  Implementation

